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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXXIII. No. 3273.] LONDON, FEBRUARY 3, 1926. [78TH YEAR. PRICE 1s.

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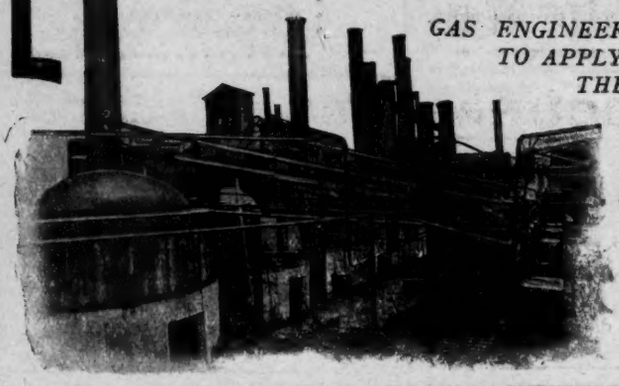

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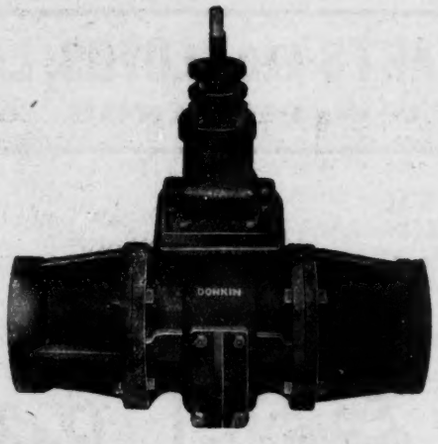

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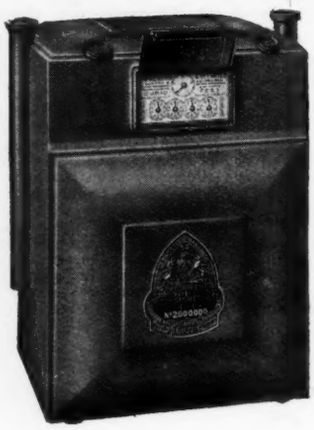

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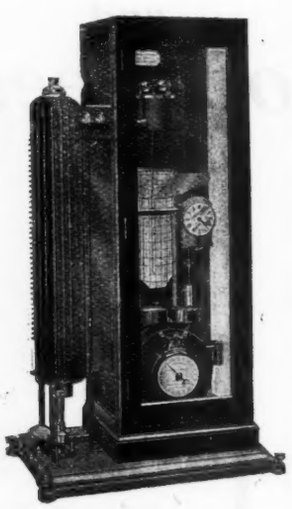

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VOL. CLXXIII., No. 3273.] WEDNESDAY, FEBRUARY 3, 1926. [78TH YEAR.

EDITORIAL NOTES.

A Question of Commissioners.

A SUBJECT has been raised in the "Manchester Guardian Commercial Supplement" which is of peculiar interest at the present juncture. It is that of "The Organization of the Gas Industry;" and the intention of the article is to press the need for better co-ordination. The author is "A Gas Engineer." He mentions in the opening of his article a matter which, we know, has lately been in certain quarters very much to the fore. It is not a new suggestion; it is, in fact, rather an old one—now revived. It is that the control of the "development" of gas undertakings should be placed under a body similar to the Electricity Commissioners. Heaven forfend! We do not wish to see the "development" of the gas industry taken by a few out of the hands of the many who are most qualified to deal with it, and upon whom the whole of the financial responsibility devolves. That way means a stereotyped policy for conditions which are so varied that they decline to be subject to set rule and regulation. Alternatively, the suggestion is that the Electricity Commissioners should be enlarged (presumably by the inclusion of men expert in the manufacture and supply of gas), making a body of Gas and Electricity Commissioners who should have powers over gas undertakings as well as electricity undertakings, similar to those of the present Electricity Commissioners over electricity concerns. The writer says the suggestion is not without some merit. We are glad to see the qualifying "some," because it eases criticism. If there was certainty that good would come out of such a body, we should be heart and soul in favour of it. But experience has tended to harden views against anything of that kind.

Supposing a body of Gas Commissioners, much would depend on the constituent members whether or not they would be of real advantage to the industry, and to the development of supplies to the community. It would never do, for example, to have Gas Commissioners composed of men whose only qualification was that they were in Government service. We cast our mind over the history of gas supply in the United States, and over the operations of the gas undertakings under the powers and authority vested in the State Public Utility Commissioners. In several matters of importance to the industry, the Commissioners, with a fine conservatism and faith in the observance of traditional decree, have stood in the path of progress. We remember their long resistance to change from illuminating to calorific value standards; we recollect, when the change was eventually made, their objections to a reduction of calorific value to the most economic levels, and their insistence upon the maintenance of high standards. This obstructive attitude (pursued in what was thought to be the public interests) was in some cases taken in opposition to the best expert opinion from within the industry itself. While research and experience have, after laborious effort, broken through much of this, even now a fairly high standard of calorific value is still prescribed, and there is not in the United States the liberty that, in this respect, we possess in this country, with the view of providing in any area the most economical supply of gas. Supposing we had a body of gas experts as Commissioners trained in the gas industry, and with first-hand knowledge of its requirements. The result might be perfectly beneficial all round; it might not be. It is a matter of pure speculation. The trouble is that, even though good and helpful Commissioners might be obtained at first, the members would not continue in office for ever. Changes come; and we cannot picture the gas industry remaining comfortable by having a body dictatorial and absolute governing their affairs. All through the piece with the Electricity Commissioners, we have seen that their policy on various matters has not received the unanimous approval of the electricity industry; and not a few administrators of electricity undertakings have been much irritated by their decisions. Now under the Government electricity scheme, we see a development of the power of the Commissioners and a lessening of that of the administrators and executive officials of the industry. Control by the Commissioners is to be increased, through the compulsory authority of the Central Executive Board, whose doings will be subject to the approval of the former. The Commissioners are unquestionably the force behind the Government scheme—a scheme the financial advantages and material benefits of which are being torn to shreds by many people in the industry for which, it is fancied, the plans will be productive of salutary results. Nice things are said about the Electricity Commissioners within the industry; things that are not so nice are said about the scheme in the engineering of which they have had such conspicuous hand. What has happened here is what usually happens in such cases, the power of the Commissioners has grown, and is still growing.

As to a composite body of Gas and Electricity Commissioners, we are afraid the gas and electricity experts would not synthesize very well; for the reason that the members would always—and quite naturally—be looking to gain superior advantage for their own particular industry. Just picture the Electricity Commissioners, the majority of whom were professionally trained in the electricity industry, considering the best interests of the gas industry, or doing anything to help to compose the conflicting relationships of the two, and impartially working for the promotion of the interests of both. When we remember the part they have had in promoting the interests of the Government in the electricity industry to the extent they have done—to such an extent, indeed, that at one time we appeared to be within measurable distance of the Government handing-over to our trading competitors a subsidy, which would have enabled them better to fight us—we cannot strain our imagination to a sufficient degree to allow us to conclude that they would disinterestedly work for the good of the gas industry. Nor can we think that the gas section of a composite Commission would be without bias.

The reason "A Gas Engineer" is of opinion that the suggestion of Gas Commissioners or a composite body of Gas and Electricity Commissioners possesses "some merit" is that a measure of co-ordination is required in the gas industry just as it is in the electricity industry. He points to the discrepancies which exist between the manufacturing efficiencies of gas undertakings, which is not always due to the coal used, or to the size of plant,

but to the inertia in policy in respect of modernization, and, we may add, supervision. At the same time, there are small undertakings which are making gas as economically as larger ones; but, through geographical situation, managerial inefficiency, and inequality of resources in various ways, there are many small undertakings which could, with considerable advantage to all concerned, be merged in the larger ones. This was the subject of an editorial article last week—the absorption of small undertakings, or their supply in bulk, in which latter case their present owners would continue to be the distributors. Again, central control with more executive power would, in the opinion of "A Gas Engineer," cause greater advantage to be taken of research, and would shorten the lag between the coming of improvements and their application. He instances the blending of coals for the production of better physical and combustible conditions in coke. In his view, the facilities for blending will only be adopted under considerable pressure. In our judgment, the pressure will progressively come from market conditions and the force of competition. Are all gas undertakings anticipating this by action?

We do not suggest that "A Gas Engineer" has anything but the best interests of the gas industry at heart. In fact, before concluding his article, he says that its object is not to advocate any particular method of co-ordination and central control in the industry; he merely wishes to point out that there is room for organization and co-operation, especially between the smaller and the larger works, so that better advantage may be taken of research and plant improvements. Actually, he only touches the fringe of what might be done. The general question has been dealt with in previous articles in the "JOURNAL;" and our view is that possible developments do not require Gas Commissioners or Gas and Electricity Commissioners to realize them. We have sufficient faith in the ability and nous resident in the gas industry to believe that, given from within itself a lead of an authoritative character, much could be done to bring about the reformation necessary where needed, to enhance the services of the industry throughout the country. There are lessons for the industry even in the Government electricity scheme; for with gas undertakings established and located as they are, a good measure of manufacturing concentration and an extension of distribution radius, even helpful interconnection, could, as suggested last week, be effected without burdensome cost. Even if not immediately fully remunerative, it is politic (looking at our changing environment and circumstances) to be constructive now for future progress and protection.

The Old Gas Light and Coke Company.

TO-DAY we publish the last accounts of the Gas Light and Coke Company in its old state. The policy of those who have controlled the destinies of the big concern has included production and business consolidation by expansion, which means annexation of territory formerly in the occupation of other companies, with their businesses and potentialities. But the greatest move in this direction that the Company have made was consummated on Jan. 1 this year, when the Brentford Gas Company (which, particularly in the latter years of its existence, was also engaged in the process of absorption and extension) became part of the already gigantic undertaking. Our modern legislators have very definite views regarding the importance of super-stations (as witness the electricity scheme) so located that the best economic conditions can be utilized for the purpose of production. The Brentford amalgamation with the Gas Light Company, therefore, is quite in harmony with Government policy in regard to electricity. Beckton, with its excellent accessible accommodation for the reception and dispatch of materials, is in a totally different position from the stations at Brentford and Southall. We can foresee an era of greater, though gradual, elimination of the less economical gas-works in and about London, and more and more concentration of manufacture as opportunity permits; and perhaps some day this will also lead in such a huge concern as the Gas Light Company to a large proportion of the coal being carbonized in greater bulk per charge in ovens. Potentiality in production has been immensely increased; and the future technical and commercial history (little, of course, will be apparent immediately) of the Gas Light and Coke Company will be as interesting as has been that of the past. From the point of view of consolidation and the opportunity for progressive concentration of gas production for a large, densely populated area with open outskirts, the Company have in an extensive region forestalled the Government electricity scheme.

However, we have to deal with the final annual accounts preceding the working of the enlarged undertaking. The single depressing feature in them is the effect of secondary products values, which alone have necessitated the raising of the price of gas. In all other respects, prosperity reigns. In gas consumption, in the demand for appliances, in the additional consumers connected-up, we have the assurance that people want gas and more of it; and therefore the industry must deliberately work with the view of doing all possible to improve the secondary products position, in order that the flow of the tide of gas patronage may be further encouraged and any ebb prevented. The position of the Company's progress in gas business last year is unfairly realized by the reference in the Directors' report to the increase being nearly 4 p.ct., of which about 1 p.ct. was supplied in bulk to the Brentford Gas Company. The sale of gas was no less than 36,504,917,000 c.ft. in 1924, and in 1925 37,893,834,000 c.ft.—a difference of 1,388,917,000 c.ft., which is the enormous increase that "nearly 4 p.ct." additional gas business means in the case of this Company. Expressed in therms at the declared value, the sale of gas last year was 189,469,170, or an increase of 6,944,853 therms. Further evidence of popularity is found in the year's lengthening of the roll of consumers by 14,211, and by an addition of 92,415 to the number of gas stoves of various descriptions sold and let on hire, which figure compares with the increase of 85,322 in 1924. When these figures and those for immediately preceding years are considered, we marvel at some holders of stock parting with it, in view of what must be merely a temporary depression in the market conditions for secondary products, and which will undoubtedly right itself in time through the work that is in hand in order to improve demand. It is due to the depression referred to that the second half of last year saw the price per therm raised from 8·6d. to 9·4d.; and the increased consumption with the additional 0·8d. per therm for half of the year accounts for the gas receipts being £6,840,875, or more than in 1924 by £561,267. To the popularity of gas, too, is due the increase of the rental of meters, stoves, and fittings from £896,717 in 1924 to £955,633 in 1925, or £58,916. The additions to the gas receipts and the meter, stove, and fittings rental together amount to £620,183; but, on the other hand, the total reduction of income from secondary products is £697,215—£77,000 in excess of the gains from gas receipts and meter, stove, and fittings rental, despite the addition to the price of gas from July last year. The total revenue from secondary products was £1,749,173, as compared with £2,446,388 in 1924. It is significant that less was obtained for the whole of the secondary products than was realized for coke alone in 1924—£1,774,326, which was in excess of the receipts for coke last year by £513,986. Breeze brought in £111,802, or £30,124 less; tar, £275,094, which was £115,580 less; ammoniacal liquor and sulphate of ammonia, £101,935, which was £37,527 less. Thus in every item of secondary products there was a falling away. There was rather less coke, breeze, and tar produced, owing to a lower quantity of coal being carbonized and more carburetted water gas made; but the bulk of the reduction in the income from secondary products is due to the lower values.

The impression this had upon the net cost of manufacture was considerable, notwithstanding the fact that coal (including all costs) was last year something like 1s. 2d. less per ton on the average than in 1924. The quantity of coal carbonized was 2,101,124 tons, or 91,167 tons less than in 1924; and the gross cost was £2,973,038, or a reduction on 1924 of £255,171, owing to the smaller cost per ton and the lower quantity used, despite the additional sale of gas. When, however, the receipts for secondary products are deducted, it is found

that, whereas the net cost of coal in 1924 was £781,821, last year it was £1,223,865, or £442,044 greater. The extra carburetted water gas made more than balanced the increase in the sales of gas. As a result 17,129,589 gallons of oil were used, or 5,344,673 gallons more than in 1924; the expenditure on it being £313,657, or £145,038 more than in the previous year. But the charge for coke for water-gas manufacture, owing to the lower value per ton, was £270,631, or £39,641 less. Adding the expenditure on oil and coke to that of coal, we have a total cost for manufacturing materials of £3,557,326, as against £3,707,100 in 1924, which figures are transformed, by deducting the receipts for secondary products, into respectively £1,808,153 and £1,260,712. There we have complete justification for the increase in the price of gas. In this connection, a few figures may be added as to manufacturing results. The total quantity of gas made was 40,470,490,000 c.ft., of an average calorific value of 503 B.Th.U., or a total of 203,373,304 therms. The corresponding figures for 1924 were 39,369,309,000 c.ft., or 197,591,214 therms. The increased production last year was therefore 1,101,181,000 c.ft., or 5,782,090 therms. The carburetted water gas made amounted to 12,615,133,000 c.ft., or more by 1,955,861,000 c.ft. than in the preceding year; and the consumption of oil was at the rate of 1·35 gallons per 1000 c.ft. last year, as compared with 1·1 gallons in 1924. The coal gas made was 27,855,357,000 c.ft., as against 28,710,037,000 c.ft. in 1924—averaging respectively 13,257 c.ft. and 13,095 c.ft. per ton of coal carbonized, or an increase of 162 c.ft. per ton, which, multiplied by the 2,101,124 tons of coal carbonized, represents an additional production from that quantity of coal over the working of 1924 of 340,382,088 c.ft. We congratulate the Chief Engineer (Mr. Thomas Hardie, M.Inst.C.E.) and the technical staff of the Company on their excellent contribution to the alleviation of the effects of the adverse conditions of the markets for secondary products.

With one exception, there are no other figures which call for comment in the revenue or manufacturing accounts. The only considerable variation is found in the increase in the repairs and maintenance of mains and services, repair and renewal of meters and stoves, and fitting-up prepayment meter supplies. An additional £98,219 was spent in these directions; but increased expenditure is imperative in a progressive gas-supply business. The total expenditure on revenue account was £8,307,232, or more by £38,375 than in 1924. The total income was £9,569,291, or less than in 1924 by £76,305. Thus it is seen that the balance carried to net revenue account is £1,262,059, or a diminution of £114,680 compared with 1924. The dividend for the first half of the year was at the rate of £5 6s. 8d. per cent., and in view of the increase in the price of gas, £4 17s. 4d. is the distribution recommended for the second half.

Apart from the opening of a new chapter in the history of the Company, and the trading experiences of last year, there are various matters of importance to the gas industry which are just now engaging widespread attention. We cannot separate the Governor of the Gas Light and Coke Company from the President of the National Gas Council; and therefore the whole gas industry will be awaiting with peculiar interest the address which Mr. D. Milne Watson will make at this particular juncture from the chair at Horseferry Road on Friday.

Average Gas Stock Holdings.

THOSE of our Socialist friends who have taken flight beyond the stage at which men see things as they really exist are very fond of attempting to place in opposite camps Capital and Labour, as though there is a strict line of demarcation between those who supply capital and those who work with brains or hands. They also talk as if those who provide capital for industry and commerce (through and by which we all live) were plutocrats, and unworthy of a place in the world. Without capital there would have been no great industries, no call for immense trade unions, and—terrible to think of!—nothing for the strife-creating enthusiasts to talk about. It would have been a slow and a dull world; but sticking to truth and avoiding exaggeration need not now make it any slower or duller. As a matter of fact, those who work, many who are members of trade unions, and the trade unions themselves (through investment of funds), are capitalists; and they are wise. The enormous number of people who hold small amounts of capital is shown by the fact that in numerous industrial concerns when the larger holdings are pooled with the small ones, and divided by the total number of holders, the average is usually found to be very modest; and this is due primarily to thrift, and co-partnership and profit-sharing schemes (with the attendant desire to increase personal capital holding in the concern which gives employment). The tendency to-day is for the number of small holders to increase; and, indeed, they are doing so day by day. This should be encouraged, by opportunities being given, whenever possible, for the small investor to take-up new capital—all the better in a concern in which he or she is employed or with which he or she locally does business—such as a gas company. This would do more than anything else to break-down the effects of the stupid piffle that is heard as to Capital and Labour from those would-be disturbers of the peace, who have a holy horror of such terms as "employer and employed" or the more modern and true one "co-workers."

We have to thank those gas companies who complied with a request which was made to them to supply data upon which an investigation could be made as to how representative gas companies stood in this matter of average holdings. Acknowledgment has also to be made of the kindness of Mr. F. J. Bradfield, the General Manager and Secretary of the Commercial Gas Company, for having undertaken the work of making the calculations for, and compiling, the interesting table published elsewhere in this issue. The major part of the Companies are considerable ones. Had there been a larger sprinkling of small ones, the average holding would unquestionably have been reduced to lower figures. In the table the data apply to twenty-five companies, and it is interesting to observe how widely different are the individual average results. For example, the average holding of the ordinary stock of the Sheffield Company is £885, while Maidstone is as low as £238. The average holding of ordinary stock for the twenty-five companies is £421; but if we eliminate the companies—less than one-third of the number—with an average of over £500, the average holding in the remaining companies would come down very appreciably. The £421, however, taking the divergent individual average holdings, shows that the capital of the gas industry is not held by multi-millionaires, or by people who need be described as Capitalists with a capital "C," and with sneering emphasis because they have been prudent and have accumulated a little money, which has assisted to finance industry, and brings them in a modest return. Not that it troubles us much; we would sooner hold the capital and be called whatever pleases the extremists among the Socialists than be without the financial backing, however small. Other modest holders will agree with us. The tabulated statement shows that the average holding of preference and loan capital in all the companies is £674, and that the average holding of the whole of the capital of the twenty-five companies is £508. But the average holding of the ordinary capital—£421—is the significant thing, although only standing as high as that figure by the aid of the larger amounts of capital individually held. A study of the table will show that the capital of the gas industry is widely distributed, and is very popular as an investment.

Opposition to the Electricity Scheme.

THE contractors for electricity plant and cables continue to applaud every favourable reference to the Government electricity scheme. They are peculiarly and materially interested, and fortunate in that their responsibility for the results of the scheme will end with the supply of the plant and its installation. The contractors for wiring and appliances are also partially elated, but uncertain as to whether it is all going to work out according to political anticipation. The more level-headed among the technical men and journalists of the electricity supply industry are seriously questioning whether the huge capital expenditure, the new operating costs, and the increase of

governing power over electricity generation are going to confer any real benefit upon the industry and upon the country. It is a pretty tangle of opinion, with the Government (urged on by the Electricity Commissioners, who desire more power) feeling they must make a show of doing something for domestic advantage, and yet unfortunately (with a marked indifference to facts) pursuing a course of great costliness to achieve—What? And if genuine benefit could come from what they are doing, it could only be, not for the present generation, but for succeeding ones. These views are gathering strength in the electricity industry; and it would have to be a strong Government who could withstand the combined force of opinion in that industry, the gas industry, and among the manufacturers of the country. The manufacturers are waking-up to the knowledge that what is being proposed plausibly for their advantage is but a political illusion, which is going to cost very many millions of capital, with its attendant obligations. The opposition to the scheme represents a large political power; and we have no doubt that full use will be made of it to induce the Government to modify their proposals or to abandon them altogether, and so allow the electricity industry to develop normally—the same as other industries have done. That way lies the strongest electrical growth. We see, too, there are some people concerned in the coal industry, and therefore the coal inquiry, who are of opinion that the Government have not been altogether fair in launching the electricity scheme before the Coal Commission have prepared their report upon the evidence submitted to them, which included views from the gas, electricity, and other manufacturing industries, as well as the wonderful scheme of the Miners' Federation for extending the operations of the coal industry to the provision (among other things) of electricity in bulk. It looks as though there has been unseemly haste in introducing the electricity scheme before the coal report was available; perhaps this is due to a little elbowing-on of the Government by the Electricity Commissioners and the Ministry of Transport.

Peace Efforts in the Coal Industry.

THERE has been considerable discussion during the past week regarding an attempt to create a new atmosphere in dealing with the troubles of the coal industry with the view of securing a peaceful solution. The Marquis of Londonderry has been the chief inspiring force in this matter; and the Prime Minister did his supporting and appealing part in a speech at Sunderland by approving the efforts. Mr. Baldwin urged those "who have the destinies of the coal industry in their hands not to play fast and loose with the employment of men in dependent trades." This aspect of the matter is generally overlooked in all trade disputes. There is much talk in trade union circles of the solidarity of labour and of alliances of trade unions for this or that purpose; but, when there is trouble, little hesitation is shown in taking action over points of self-interest without considering how it will affect the position of the workers in other industries. In this there is an utter absence of evidence of solidarity, unity, or anything of a considerate nature. There was an example just recently in connection with the question of wages and conditions in the railway world, when some of the extremists wanted to reject the award of the National Wages Board, and to call a strike as from last Friday. But fortunately the sagacity and statesmanship and patriotism of the Rt. Hon. Mr. J. H. Thomas, M.P., and Mr. C. T. Cramp had influence, and the deplorable menace was averted. It was a close shave. Supposing the extremists had prevailed, and the railways had stopped their running, this would have prevented the movement of coal, and would at once have precipitated the coal industry and the workers in it into a worse position than the bad one which it and they now occupy. The dire effects would not have stopped there. We have seen them on former occasions when there has been a stoppage of the coal industry. Workers in other industries have been thrown into a state of unemployment, and they and their families have suffered great privations through the absence of coal supplies. We hope that the coal owners and men in the industry will, as Lord Londonderry has suggested, get together and discuss their problems with all the cards on the table, seeing that there is no radical difference between the interests of both parties. Some observers are sanguine that the movement which has been started will result in a round-table conference, at which efforts will be made to find a way out of the crisis which is threatened next May. We trust that such a conference will come about, and that it will be successful; for with signs of a brightening of trade prospects, it would be a national calamity of the very worst order to have now a cessation of the work of coal mining. Through the results, the coal industry would be in worse case than ever.

The Growing Subsidy.

During last week-end, the Mines Department issued a statement which showed that the cost of the coal subsidy in December had a sharp rise. It amounted to £3,446,289. This exceeds by £246,000 the estimate which appeared in the White Paper published by the Government last autumn. The official anticipation was that by the end of the calendar year, the subsidy would cost £11,900,000; but the total is £12,184,051—a difference of £284,051. Official optimism suggests that payments will now be on a diminishing scale, and that the cost for the whole of the subsidy period (which will end on April 30) is not likely to exceed £22,000,000.

Fusion of the Gas Workers and Transport Unions.

According to a newspaper report, Mr. Will Thorne, M.P., the General Secretary of the National Union of General and Municipal Workers, has been addressing the gas workers at Brentford. In the course of his speech, he referred to the amalgamation of the Company with the Gas Light and Coke Company; and he expressed the view that, if amalgamations were good for gas undertakings, they were also good for labour unions. We cannot quite appreciate the logic of this, in view of the fundamental differences which obtain in commercial undertakings and organizations dealing with the wages and conditions of labour. However, Mr. Thorne gave the information that the Executive of his Union had met the Executive of the Transport Union, and they had recommended to their respective bodies the advisability of complete amalgamation under a mutually agreed comprehensive title. Each side had also decided to appoint a Sub-Committee for the purpose of drafting the rules and constitution for the new body. He also stated that it is hoped that the fusion will be completed during the current year.

The Road Fund.

The gas industry is interested in the Road Fund from two points of view: First, the larger the expenditure on roads, the greater the likelihood of increase in the demand for tar for the purpose; secondly, on the ground which primarily brought the matter of the utilization of the fund to the fore—the intimation of the Chancellor of the Exchequer that part of the fund might be diverted to the development of the Government electricity scheme. This idea, of course, has now been definitely abandoned. The other day the Chancellor redeemed his promise to hear various public bodies who desired to make representations to him regarding the future of the fund. They were evidently very anxious about the matter, as Mr. Churchill had made it known that, in his view, such sources of revenue and the application of the money should be periodically reviewed, seeing the need for additional tribute to the Exchequer for expenditure in ways other than those for which (as in this case) there was original earmarking. The deputation was composed of representatives of the Municipal Corporation Association, the County Councils Association, the Urban District Councils Association, the Rural District Councils Association, the Scottish County Councils Association, and the Convention of Royal Burghs. The various speeches were unanimously adverse to the proposals to divert any of the revenue of the road fund to purposes other than the maintenance, improvement, and construction of roads; also in the course of the proceedings, reference was made to the enormous damage which is caused to roads by modern heavy vehicles. As was no doubt expected, the Chancellor, in his reply, declined to accept the contention that the Government are debarred in perpetuity from reviewing

the expenditure upon roads, or that in no circumstances whatever should any portion of the proceeds of motor taxation be applied to purposes other than roads. It is clear that he needs no convincing as to the vital importance of maintaining and improving the road system of the country, in order to cope with the requirements of modern transport; but he holds that it is the duty of the Government to take a broad view of the whole field of our national needs, and to relate sectional interests to the general welfare of the community. Regarding the damage by heavy vehicles, Mr. Churchill is of opinion that the existing system of taxation of motor vehicles is unfair and uneconomic in its incidence, and that ratepayers are in effect subsidizing certain users of motor transport. In respect of the construction of new roads, he is obviously of opinion that investigation should be made as to whether, in the present state of our finances, there is not an undue proportion of our national resources being devoted to this purpose. At the same time, he gave the consoling assurance that he does not contemplate any diminution of the assistance now being given for the upkeep of existing roads; nor is he entertaining the idea of stereotyping grants for the purpose.

Wages in the Engineering Industry.

There was profound disappointment when it was learned, at the end of last week, that there had been a breakdown of the negotiations between the Engineering Employers' Federation and forty-seven Trade Unions in the engineering industry regarding the question of wages. Considering the serious depression in the industry at the present time, the demand by the men for a flat rate increase of £1 a week in wages is, to say the least, unjustified; and one would have imagined that common sense alone would have suggested to the Unions that it would be preferable to allow a sufficient period to elapse before pressing their claim, so that it might be ascertained whether any improvement in trade was likely to take place and be abiding. In this event, there would have been a basis for discussion, and for an amicable adjustment of the questions which have been the subject of long and serious negotiation. The breakdown occurred last Thursday at a conference between the representatives of the parties; and the Unions have now declared that they consider themselves free to take whatever action they may think fit.

Rating and Valuation Act.

This Act does not come into operation until April 1; but the Ministry of Health, it is understood, have issued to county councils and other local authorities a circular explaining the steps they will require to take in order to comply with the provisions of the measure. The new rating authorities will have their hands pretty full in entering upon their work, seeing that the aggregate gross annual value of ratable properties in England and Wales which will come under their review exceeded in April last £297,000,000; and in respect of these properties, the rates collected amount to upwards of £114,000,000 annually. Local authorities are urged to take immediate steps in regard to the constitution of assessment areas and committees. Accompanying the circular is a memorandum which makes clear the position of overseers up to April 1, 1927, when their office will be abolished.

CAPITAL HELD BY THE SMALL INVESTOR.

Investigation in the Gas Industry.

STATEMENTS have frequently been made during the past few years that the big utility undertakings are in the hands of a few capitalists; and recently the Liverpool and District Economic League, in collaboration with the Central Council of Economic Leagues, compiled, with the object of showing the fallacy of this contention, a table of the average holdings of large undertakings, including banks, insurance, shipping, railways, and other industrial concerns. With the exception of the railways, which varied from £1319 to £1687, the figures indicated that the holdings averaged a few hundred pounds only.

By the courtesy of the managements of the various Companies, we are able to publish similar information in respect of twenty-five gas companies, including, with few exceptions, all the principal Companies operating in the country.

The first three columns refer to the Ordinary Capital, the next three to the Preference and Loan Capital, and the last three to the Total Capital. The amount of Capital is that upon which dividend or interest is paid.

With regard to the Ordinary Capital, it must be remembered that co-partnership, owing to the practice of some Companies to allot stock to the employees, tends to reduce the average holding; but, on the other hand, in other Companies the stock is held in the names of trustees, in which case the average holdings would increase. It will be seen that the results differ materially.

In the case of the average holdings of Ordinary Capital, the Sheffield Company is the highest, with an average of £885, and the Maidstone Company the lowest at £238. With regard to Preference and Loan Capital, the Sheffield Company is again the highest, with an average of £5686, and the Derby Company the lowest at £270. But it should be remembered that the practice of the insurance and other companies to invest in this class of security has the effect of raising the average holding.

The average holdings of the whole of the Companies included in the Table are as follows:

Ordinary Capital.	Preference and Loan Capital.	Total Capital.
£ 425	£ 674	£ 509

Compiled by Mr. F. J. BRADFIELD, General Manager and Secretary of the Commercial Gas Company.

Name of Company.	Amount Ordinary Capital.	Number of Holders.	Average Holding.	Amount Preference and/or Loan Capital.	Number of Holders.	Average Holding.	Total Capital.	Number of Holders.	Average Holding.
	£		£	£		£	£		£
Alliance and Dublin	1,551,868	2,788	557	374,000	600	623	1,925,868	3,344	576
Bournemouth	595,050	2,067	288	587,025	871	674	1,182,075	2,466	479
Bristol	1,287,500	2,727	472	338,290	688	492	1,625,790	3,255	499
British	855,000	2,020	423	557,000	891	625	1,412,000	2,598	544
Cardiff	626,860	1,430	438	405,270	672	603	1,032,130	1,830	564
Chester	157,150	419	375	126,930	236	538	284,080	566	502
Commercial	2,073,280	3,819	543	475,000	751	632	2,548,280	4,126	618
Derby	492,270	943	522	55,000	204	270	547,270	992	552
Hastings and St. Leonards	381,240	839	454	75,080	118	636	456,320	902	506
Hornsey	213,200	288	740	111,957	223	502	325,157	432	753
Lea Bridge	235,242	492	478	160,426	333	482	395,668	760	521
Liverpool	2,127,340	3,982	534	1,036,633	2272	456	3,163,973	6,254*	506
Maidstone	165,736	697	238	63,480	210	302	229,216	801	286
Newcastle and Gateshead	2,061,315	3,116	662	1,301,832	1303	999	3,363,147	3,708	907
North Middlesex	106,530	389	274	155,700	478	326	262,230	789	332
Plymouth and Stonehouse	355,162	1,470	242	149,835	371	404	504,997	1,715	294
Portsea Island	330,612	896	369	148,000	399	371	478,612	1,101	435
Sheffield	1,736,968	1,963	885	580,000	102	5686	2,316,968	2,024	1145
South Metropolitan	6,609,895	19,965	331	2,629,445	2795	941	9,239,340	22,016	420
South Shields	224,820	587	383	148,492	239	621	373,312	826*	452
South Suburban	1,187,795	3,609	329	470,037	1247	377	1,657,832	4,534	366
Southampton	647,740	1,350	480	276,275	345	801	924,015	1,559	593
Tottenham	1,002,275	3,411	294	519,140	817	635	1,521,415	3,876	393
Tynemouth	245,542	587	418	110,485	256	432	356,027	775	459
Wandsworth	1,148,086	2,949	389	580,659	557	1042	1,728,745	3,251	532
	26,418,476	62,803	421	11,435,991	16,978	674	37,854,467	74,500	508

*In these cases the number of the holders is the *total* of the holders of the two classes of Stock.

PERSONAL.

Mr. WALTER DUFFIELD, the City of London Gas Examiner, has been in the service of the Corporation for 51 years, and is still in regular attendance at his office in Whitecross Street. Mr. Duffield succeeded Prof. Vivian B. Lewes as City Gas Examiner on the latter's death in 1915.

OBITUARY.

THOMAS POTTERTON.

It is with much regret that we have to announce the death of Mr. Thomas Potterton (senior partner in the firm of Thomas Potterton, heating engineers, of Cavendish Works, Balham), who passed away on Tuesday, Jan. 26, in his 79th year, at his residence, 15, Ravenslea Road, Wandsworth Common. His health had been failing for about two years, the last eighteen months of which were spent indoors. During last summer he became so weak that he took to his room, exhibiting remarkable patience and endurance, and thinking all the time of others. In this his fine character was displayed, as throughout his business career. A noticeable change occurred in his condition about a fortnight before the end, which happily was peaceful. He celebrated his golden wedding during the summer of 1922, and is survived by his wife, to whom (together with his two sons and daughter) heartfelt sympathy is extended. The funeral took place last Saturday; the service being at St. Mary's, Balham, and the interment at Wandsworth Cemetery.

At the age of 23, in the year 1870, upon the death of his father (Thomas Potterton), deceased took over the business established in 1850 by his father, which he developed as a heating engineer, inventing and patenting in the 'nineties special forms of kitchen ranges and boilers for the better utilization of fuel, which was then usually coal. From the year 1900 onwards, recognizing the great utility of gas, he directed his attention particularly to the gas side of the heating industry, inventing and perfecting a system of gas-heated hot water apparatus in which the "Victor" boiler plays the chief part.

The earliest patterns of "Victor" boilers embodied the essential features of the present-day models; being from the outset of sectional design, wherein lies the advantage of intermediate circulation with progressive temperatures. This scheme, in conjunction with the "cut-out" valve system (patented in the year 1904), has proved of great utility in hot water apparatus connected with domestic supplies. Other developments and patents in his water heating appliances came about in the years 1916 and 1921; while as recently as 1922-3 he applied some of his leisure to perfecting the "Victory" combination boiler for the use of both solid and gaseous fuels. There were other patents in respect of "Seal-ed" oven cookers and "Queen" combined gas and coal ranges. During his many working years he handled numerous problems of a special nature requiring considerable judgment.

Mr. Potterton was one of the founders in 1898 of the Institution of Heating and Ventilating Engineers, on the Council of which he sat for several years; and he was a member of the Society of British Gas Industries. He was also a familiar figure at numerous trade exhibitions in London—the Building Trades Exhibition (from the commencement some 30 years ago), the "Daily Mail" Exhibition (likewise from the first of the series), and various smoke abatement exhibitions—even back to the days of the Royal Aquarium, where he displayed, at the autumn show of the Horticultural Chrysanthemum Society, his patents in coke boilers and other apparatus connected with conservatory heating and domestic purposes. Until midsummer, 1924, he daily visited his works at Balham; and although gradually taking more leisure, he did not cease to keep in touch with the technical side of the business.

The late Mr. Thomas Potterton.

The business will be carried on under the same name as heretofore by the two surviving partners—Mr. A. B. Potterton and Mr. T. F. C. Potterton.

The death took place, on Jan. 23, of Mr. JOHN T. HOWARTH, of Poulton-le-Fylde, who for many years was Chairman of the Whitworth Gas Company. Owing to ill-health, he retired from this position three years ago, but remained a Director.

The death has occurred, at Milford Haven, of Mr. FRED CHADDERTON, Gas and Water Manager there, and formerly Assistant, and later Manager, of the Barrow Corporation gas and water undertakings. He went to Barrow from Oldham in 1907, and left in August, 1922. Eighteen months ago he was appointed Manager at Milford Haven.

ELECTRICITY SUPPLY MEMORANDA.

IN the electricity supply industry (as distinct from the plant-manufacturing part), doubts upon, and objections to, the Government scheme for its reformation are growing. The more the different financial aspects of the proposals are investigated, the more clouded become the generous predictions, which are far from being justified. Ill-forebodings persist, despite the assurances of the Electricity Commissioners to the doubters: "It is all right. We have made careful examination of our estimates; and the figures have been checked by competent authorities." But satisfaction cannot be secured; and we should not be at all surprised to find that the upshot will be that the most forcible opposition to the Government plans will come from the electricity industry itself. Capital charges have always been a heavy item in the total costs per unit of electricity, as the lighting consumers know; and yet the capital charges at present existing are to have piled upon them those which will be produced by the work of the Central Executive Board in respect of standardization, interconnection, transformation, and transmission. The interest and sinking fund requirements of this enormous capital outlay will constitute a new charge on electricity supply; and yet the prices for current sold by the Board are to be of an order which will satisfy their financial obligations. The best that can be hoped, therefore, is that their charges will have to be equivalent to the generating costs at the stations working at the highest efficiency, *plus* their own capital and operating expenses. The "Electrical Review" is, in common with many men (ourselves among them, if we may be permitted a place in a crowd which is strongly electrical), sceptical as to the new expenditure being remunerative through the economies which may be secured in the costs of generation. If there was the certainty about it which the Electrical Commissioners profess to feel, why, asks our contemporary, is it necessary to have a Government guarantee? There is, of course, a beautiful and touching simplicity about the question. The Government guarantee is a little ruse put forward with (we might almost say) the craftiness of a promoter of a company of questionable stability for the purpose of securing investment money from the public. The guarantee gives to the investment a security for which there has to be payment by the investor through a lower return than he might otherwise get for his money. Our contemporary sees no hope of a return on the capital save at the consumers' expense, which is the reverse of what the Government, in its great faith, anticipates. What the "Review" can see is that three profits are to be made between the coal pile and the consumers' terminals. Saving in fuel cannot affect the generating costs materially except in bad cases. It is the cost of distribution which requires to be reduced. But the scheme proposes to increase it; and it is pardonable to conclude that this will not be to the advantage of the areas supplied from existing stations where generating costs are low, and distribution is confined to a reasonable radius, with good electricity-consuming density. From its analysis of the information available, so little regard has the "Review" for the scheme that it says: "No

Financial Aspects of the Scheme.

wonder the Prime Minister did not think the scheme would be the salvation of industry." It also fears "that the Government have tackled the wrong end of the problem; it is embarking on an unprofitable outlay." On the other hand, the "Electrician," in an article which fails to examine the Government scheme with the analytical skill of the "Review," says: The scheme "will help us to obtain what is required—the generation of electricity at the cheapest rate, its most widespread distribution, and a reduction of its price." Either the writer of those words is a super-optimist, or the ascertaining of the balance of advantage from the facts presented is beyond his capacity.

The Sentient Mr. Robinson.

There is always interest in reading what Mr. L. L. Robinson, of Hackney, has to say, because he not only thinks and has ideas of his own, but he has the courage of his convictions. There may not always be agreement with him; but, in his criticism of the Government scheme, there is much with which it is easy to concur. He rightly objects to its being dressed up in a manner to impress the public that they may expect immediate reductions in the price of electrical energy. The little that Mr. Robinson thinks of the scheme as an effective instrument is shown by the fact that he categorically says it will not begin to show its effect much under ten years, and will not be really beneficial to any large extent under twenty years. He also sits on another misleading feature. It is that, in the presentation of the scheme, the public have been led to believe that the cost of generation is the *alpha* and *omega* of the electricity supply business. This, of course, is a huge mistake; and the critic proves it is so. He says: Let us assume for a moment that the provision of super-stations can save 15 p.ct. of fuel and 20 p.ct. of the plant cost, as compared with a good modern medium-sized station. Even so, these advantages will be counterbalanced largely by the extra cost of transmission. He discounts the claim (which nobody has ever taken the trouble to prove) that the load factor of super-stations will be so great that it will counterbalance the disadvantage of high cost of transmission. His view in this regard is somewhat confirmed by the fact that a few years ago he collected the whole of the load curves for the London area, superimposed them, and compared the load factor for the large area with the load factor of the individual areas; and he found that it was not materially greater. To him the Government scheme appears to overlook the enormous importance of improving the load factor within each distributing area. Mr. Robinson concludes his criticisms as follows: "In the area with which I have the honour to be connected, I do not find that the cost of electricity is the bar to large consumption. The difficulty is the cost of installation and apparatus; and I think the Government will enormously improve their scheme if they give to all undertakers full powers to sell and hire apparatus and installations, and full powers to enable them to provide large demonstration establishments for the education of the public in the proper use of electricity. Probably under the Trade Facilities Act, the distribution and installation side of the business could have the help which is being proposed for the generation side of the business; and, in my opinion, it is at this end of the business that Government assistance will produce results more rapidly." We think the word "will" in the last sentence should be "could."

Another Critic.

Leaving Hackney, and passing to the South-West of England, we find that at the annual dinner of the West Gloucestershire Power Company, the General Manager and Chief Engineer (Mr. H. S. Ellis) had something to say concerning the Government scheme. He considered that Mr. Baldwin's exposition of the matter had been couched in a much too optimistic vein. If, he said, at their power station, coal and wages cost them nothing, they might achieve something near the figure given by the Prime Minister—not otherwise.

Hot Water Business.

In the "Memoranda" for Jan. 20, comment was made upon a letter to "The Times" by Mr. F. J. Moffett, who is a member of the Institution of Electrical Engineers. In that communication, he suggested that the heat losses in connection with electricity generation could be reduced from the prevailing average of 85 p.ct. down to about 40 p.ct. by electricity undertakings engaging in the supply of hot water for heating and other purposes. In his opinion, this could be done by utilizing the exhaust steam to heat water, and then distributing it through pipes suitably insulated. In those circumstances, the supply of electricity could be regarded as a "secondary product." Touching this matter, it is interesting to note that, at the annual dinner of the South Midland Centre of the Institution of Electrical Engineers, the President of the premier body (Mr. R. A. Chattock) said that the capital cost of supplying hot water to a district in the way suggested would be very heavy, and, in addition, there would be the costs of pumping. Besides, the water would often reach the consumer in a lukewarm condition. This is a matter into which Mr. Chattock went some years ago in connection with the Summer Lane station of the Birmingham Corporation Electricity Department; and he then came to the conclusion that it would be much cheaper for a householder to heat water by coal or coke. Though not bearing directly upon this subject, there was one other observation which Mr. Chattock made, which is also worthy of mark. It had reference to the "all-electric" house. Reminding his hearers of the recent paper by Dr. Parker-Smith, of Glasgow, in which the author said that the annual bill for electricity in his "all-electric house" was about £43, Mr. Chattock stated that a friend of his living in a country district near London informed him the other day that a similar service there would cost between £200 and £300 a year. The speaker thought that, instead of imposing so much standardization on the country, it would be far better if the central authorities tackled gross inequalities of this kind.

Inefficient Consumers, and the Light that Fails.

It must have been Uncle Podger who wrote to the "Daily Mirror" last Wednesday regarding the attitude of the gas industry to the Government Electricity Bill. He signs his letter "Modern;" but his modernity obviously does not include that very simple knowledge which is needed to obtain from an incandescent gas-burner an excellent light of good quality, with the smallest amount of inconvenience. He takes only one branch of gas service—lighting—which, manipulated by him, is bad, and apparently from this he condemns the whole of the applications of gas. In connection with lighting, he says that he fails to see how the advocates of "all-gas houses" manage to justify their claims that gas is the thing for illumination. He states that he has just performed his usual monthly "spring clean" of the six gas-burners in his house; and proceeds: "After scraping out the thick soot which so quickly forms on them, it usually takes me about half-a-day to assemble the numerous parts of the burners, which, even in the best makes, seem to be built on German tin toy lines. I am lucky if I have to replace only 50 p.ct. of the mantles during these operations." This statement suggests that the writer who calls himself "Modern" patronizes burners which are not of an efficient type, or, if they are of respectable design, then he certainly has no acquaintance with the elementary rules necessary for their maintenance in good working condition. We turn from the "Correspondence" columns of the "Mirror" to p. 2 of the same issue. There we see the following paragraph:

ACTON IN THE DARK.

Electric lighting failed in central Acton last evening; and in one cinema no pictures could be shown for fifty minutes.

We turn to p. 17 of the same issue, where we read:

CANDLE-LIGHT SURGERY.

OPERATIONS CONTINUED WHEN LIVERPOOL'S ELECTRICITY FAILED.

Two breakdowns of electric power and light caused considerable inconvenience in Liverpool yesterday. During the first, operations in hospitals were finished by candle light, and at the Assizes a burglary case, which Mr. Justice Swift was trying, was continued without lights. Later another breakdown stopped tramcars, and lifts filled with passengers.

From another source, we learn that, during the busy shopping hours in Oswestry on the previous Saturday evening, the electric light failed for two hours in the business quarters. Hurricane lamps and candles were brought into use. Both customers and shopkeepers were placed at considerable disadvantage in regard to purchases. One butcher complained that he had done nothing for fifty minutes, and that the electric light failure would mean a loss of several pounds worth of business.

FORTHCOMING ENGAGEMENTS.

Feb. 6.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Joint meeting with the South Wales Section of the Society of Chemical Industry, at University College, Swansea. Paper on the "Microscopy of Coal," by C. A. Seyler.
Feb. 9.—NATIONAL GAS COUNCIL.—Meeting.
Feb. 9.—FEDERATION OF GAS EMPLOYERS.—Meeting.
March 5.—MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.—General meeting at the Midland Hotel, Manchester.
May 6.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring meeting at Ipswich.

INSTITUTION OF GAS ENGINEERS.

Feb. 9.—ADVISORY COMMITTEE ON EDUCATION.—4 o'clock.
Feb. 10.—EMERGENCY COMMITTEE.—11 o'clock.
FINANCE COMMITTEE.—12 o'clock.
COUNCIL.—2.30 p.m.

Cornish Association of Gas Managers.—At the annual meeting of the Association held at Truro on Friday last, Mr. F. R. G. Grant, Engineer and Manager of the St. Ives Corporation Gas Department, was re-elected President, and Mr. F. G. Kingwell, of Falmouth, Hon. Secretary, for 1926. Mr. J. N. Gibson, who was recently appointed Engineer and Manager to the Launceston Gas Company, was elected a member of the Association.

GAS LIGHT AND COKE COMPANY.

Annual Report and Accounts.

The following is the report of the Directors of the Company for the year ended Dec. 31, which will be presented at the ordinary general meeting on Friday next.

The accounts for the year show that, after paying in respect of the June half-year dividends at the rate of 4 p.ct. per annum on the 4 p.ct. preference stock, 3½ p.ct. per annum on the 3½ p.ct. maximum stock, and £5 6s. 8d. p.ct. per annum on the ordinary stock, and after contributing the sum of £20,000 to the redemption fund, there is a total available balance of £649,123 1s. 7d., out of which the Directors recommend the payment of the following dividends in respect of the December half-year: On the 4 p.ct. preference stock at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock at the rate of 3½ p.ct. per annum; and on the ordinary stock at the rate of £4 17s. 4d. p.ct. per annum, which, together with the further sum of £15,000 to be contributed to the redemption fund, will absorb £541,134 12s. 8d., and leave £107,988 8s. 11d. to be carried forward to the credit of the current year.

The sale of gas during the past year shows an increase of nearly 4 p.ct., of which about 1 p.ct. represents gas supplied in bulk to the Brentford Gas Company. There has been an addition for the year to the number of the Company's consumers of 14,211, and an increase of 92,415 in the number of gas stoves sold and let out on hire.

The price of gas for the first half-year remained at 8·6d. per therm (3s. 7d. per 1000 c.ft.); but, in view of the serious reduction in the revenue caused by the fall in the price of residuals generally, and especially in the price of coke for export, the Directors had to advance the price of gas to 9·4d. per therm (3s. 11d. per 1000 c.ft.) as from the reading of the meter indices for the June quarter.

The Bill in Parliament providing for the transfer to the Company of the undertaking of the Brentford Gas Company successfully passed through all its stages, and received the Royal Assent on June 30. Under this Act, the Company took over the undertaking of the Brentford Gas Company on Jan. 1, 1926; and it is hoped that the amalgamation will benefit both the Company's consumers and stockholders. Following upon the amalgamation, the Directors have elected Mr. R. J. N. Neville, M.P., who was for many years Chairman of the Brentford Board of Directors, to be a Director of this Company.

A Bill in Parliament has been deposited to confer additional borrowing powers upon the Company, and for other purposes. The clauses of the Bill will be explained to the proprietors when, in compliance with standing orders, it is submitted for their approval at an extraordinary meeting, which will be held after the ordinary general meeting.

The Directors on Nov. 17 gave notice of their intention to apply to the Board of Trade for a revision of the Company's standard price under section 1, sub-section 3, of the Gas Regulation Act, 1920; and it is expected that the Board of Trade will hold a public inquiry into the matter shortly.

In view of the Government's expressed intention to introduce further legislation in regard to electricity, every effort has been made, and it is hoped with success, to safeguard the interests of the gas industry.

The Company again joined with many other gas companies throughout the kingdom and colonies in providing a gas exhibit at the British Empire Exhibition, 1925. This was one of its most successful features, and further interest was added by a special exhibit of coke appliances.

DAVID MILNE WATSON,
Governor.

Horseferry Road, Westminster, S.W. 1,
Jan. 28, 1926.

The Accounts.

The following are the main features of the accounts for the year:

The statement of capital (stock) sets forth that the total paid-up is £10,588,420; added on conversion, £12,941,060—total amount authorized £23,529,480. Deducting the amount redeemed, £453,960, the total amount of the Company's existing capital powers is £23,075,520.

	Expended this Year.	Total to Dec. 31, 1925.
Expenditure to Dec. 31, 1924		£15,937,445 12 5
Expenditure during the year to Dec. 31, 1925—		
Land acquired, including law charges	£44,119 10 0	
Buildings and machinery in extension of works	136,081 0 11	
New and additional mains and service-pipes	219,854 16 1	
Do. do. meters	25,828 2 6	
Do. do. stoves	164,630 11 7	
		590,514 1 1
		£16,527,959 13 6
By amount written off plant	£7,074 0 0	
,, depreciation fund	20,796 13 4	
,, depreciation of stoves	55,103 0 0	
		82,973 13 4
Total expenditure		£16,444,986 0 2
Nominal amount added on conversion		14,580,830 0 0
		£31,025,816 0 2
Deduct amount of capital redeemed under the Gas Light and Coke Company's Act, 1903—		
Per previous account	£407,175 0 0	
This year	46,785 0 0	
		453,960 0 0
		£30,571,856 0 2

REVENUE ACCOUNT.

Revenue.

Year, 1924.		£ s. d.	£ s. d.
£6,096,574	Sale of gas— Per meter at 8·6d. and 9·4d. per therm	6,646,769 19 8	
183,034	Public lighting and under contracts	194,105 10 4	
6,279,608			6,840,875 10 0
227,623	Rental of meters	..	234,994 10 3
288,178	Rental of stoves	..	322,495 12 3
380,916	Rental of fittings	..	398,144 4 6
	Residual products—		
1,774,326	Coke, less labour, &c.	1,260,340 9 7	
141,926	Breeze, less ,, ,,	111,802 19 6	
390,674	Tar and tar products	275,094 16 11	
139,462	Ammoniacal liquor and sulphate of ammonia	101,935 2 9	
2,446,388			1,749,173 8 9
22,764	Rents receivable		22,995 2 0
619	Transfer fees		613 11 6
9,645,596			9,569,291 19 3

The statement of loan capital stands thus: Total paid-up, £3,294,160; added on conversion, £1,639,770; remaining unissued, £750,000—total amount authorized, £5,683,930.

CAPITAL ACCOUNT.

The capital account shows receipts (with premiums, £1,707,183) to the amount of £29,763,418. The expenditure is shown in the first of the following tables:

Expenditure.

Year, 1924.		£ s. d.	£ s. d.
£3,228,203	Manufacture of gas— Coal, including all expenses thereon	2,973,038 12 10	
168,619	Oil ,, ,, less value of oil tar	313,657 4 11	
310,272	Coke, &c., used in the manufacture of carburetted, &c., water gas	270,631 18 2	
80,793	Salaries of engineers and other officers at works	86,930 10 5	
346,537	Wages	383,317 7 1	
43,210	Purification	35,299 12 7	
1,323,105	Repair and maintenance of works and plant, materials and labour, less received for old materials, £17,075 16s. 8d.	1,334,314 13 0	
			5,397,189 19 0
	Distribution of gas—		
365,375	Salaries and wages (including rental clerks) and cost of pumping gas	383,776 9 10	
470,203	Repair and maintenance of mains and service-pipes, &c.	511,696 9 8	
232,240	Repair and renewal of meters	268,465 16 7	
4 5,582	,, ,, stoves	471,312 7 5	
59,145	Fitting up automatic meter supplies	63,920 6 10	
			1,699,171 10 4
111,418	Public lamps—lighting and repairing	..	94,479 9 8
	Rents, rates, and taxes—		
18,920	Rents payable	18,441 16 0	
515,752	Rates and taxes	540,794 17 5	
			559,236 13 5
	Management—		
10,000	Directors' allowance	10,000 0 0	
600	Company's Auditors	600 0 0	
48,185	Salaries of management staff	51,162 7 6	
136,746	Collectors and cashiers	141,532 7 8	
31,803	Stationery and printing	36,748 16 1	
48,295	General charges	49,051 13 10	
			289,095 5 1
71,795	Co-partnership	..	73,462 4 0
2,462	Parliamentary charges	..	4,202 8 4
1,522	Law charges	..	1,358 16 7
556	Rating charges	..	2,461 15 11
8,464	Bad debts	..	7,851 17 8
1,000	Depreciation fund for works on leasehold lands	..	1,000 0 0
117,586	Annuities and contributions to superannuation funds	..	119,745 1 9
7,623	Workmen's compensation	..	8,421 1 1
44,965	Company's contribution under National Insurance Acts	..	45,453 9 11
	Public officers, &c.—		
3,740	Contribution under Gas Regulation Act, 1920, and Official Auditor	2,681 6 11	
1,129	Public testing-stations	1,421 15 3	4,103 2 2
8,268,857			8,507,232 14 11
1,376,739	Balance carried to net revenue account		1,262,059 4 4
9,645,596			9,569,291 19 3

Total Wages Paid 1925, £2,390,333. Total Salaries Paid 1925, £541,117.

NET REVENUE ACCOUNT.

The total of the net revenue account is £1,485,642. The following statement shows how it is appropriated:

Year 1924.			
£159,003	..	Interest on debenture stocks and bonds for the year	£159,007 18 0
48,937	..	Interest on temporary loans and sundry funds, less credits	91,831 18 10
		Dividends, &c., for the half-year to June 30, 1925:	
81,245	..	Dividend on the 4 p.ct. consolidated preference stock, £81,244 14s.	
45,500	..	Dividend on the 3½ p.ct. maximum stock, £45,500	
20,000	..	Contribution to redemption fund, £20,000	
£5 6s. 8d. p.ct. 440,081	..	Dividend on the ordinary stock (£5 6s. 8d. p.ct. per annum), £438,935 4s.	
586,826			585,679 18 0
809,263	..	Balance applicable to redemption fund and to dividends, December half-year, 1925	649,123 1 7
£1,604,034			£1,485,642 16 5

Proposed Appropriation of Balance on Net Revenue Account, Dec. 31, 1925.

Year 1924.		£ s. d.	£ s. d.
£809,263	Balance	..	649,123 1 7
	Amount required for dividends, &c., for the half-year to Dec. 31, 1925:		
£81,245	Dividend on the 4 p.ct. consolidated preference stock	81,244 14 0	
45,500	Dividend on the 3½ p.ct. maximum stock	45,500 0 0	
20,000	Contribution to redemption fund	15,000 0 0	
£5 6s. 8d. p.ct. £438,935	Dividend on the ordinary stock, £4 17s. 4d. p.ct. per annum on £16,413,285	399,389 18 8	
£585,680			541,134 12 8
£223,583	Balance carried to next year's account	..	£107,988 8 11

The four statements relating to the redemption, reserve, special purposes, and depreciation funds stood as follows on Dec. 31: Redemption fund, £20,000; reserve fund, £137,955; special purposes fund, £499,904; depreciation fund, £97,560.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the year as follows: Coal, £352,899; gas oil, £103,962; coke, £39,260; tar and ammoniacal liquor and products, £151,552; sundry stores, £818,991. The figures at the end of 1924 were: Coal, £411,526; gas oil, £103,569; coke, £123,223; tar and ammoniacal liquor and products, £190,007; sundry stores, £777,846.

Statement of Coal.

—	In Store Dec. 31, 1924.	Received during Year.	Carbonized during Year.	Used during Year.	In Store Dec. 31, 1925.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	280,985	2,089,725	2,101,124*	3247	266,339

* In addition to this quantity of coal, 17,129,589 gallons of oil have been used during the year.

Statement of Residual Products.

Description.	In Store Dec. 31, 1924.	Made during Year.	Used during Year.	Sold during Year.	In Store Dec. 31, 1925.
Coke—tons	107,150	1,334,101	236,322	1,152,582	52,347
Breeze—tons	13,090	220,388	31,714	193,579	8,185
Tar, from coal only—galls.	2,094,579	20,391,335	20,546,292	25,078	1,914,544
Ammoniacal liquor—butts	31,684	613,213	608,822	..	36,075

Statement of Gas Made, Sold, &c.

		Quantity Made.	Quantity Sold.			Quantity Used on Works, &c.	Total Quantity Accounted for.	Quantity Not Accounted for.	Number of Public Lamps.
			Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).	Total Quantity Sold.				
1925.	Cubic feet (thousands).	40,470,490†	819,039	37,074,795	37,893,834	542,726	38,436,560	2,033,930	40,190
	Therms §	203,373,304	4,115,932	186,308,825	190,424,757 *(189,469,170)	2,727,344	193,152,101	10,221,203	
1924.	Cubic feet (thousands).	39,369,309	829,491	35,675,426	36,504,917	542,868	37,047,785	2,321,524	40,904
	Therms	197,591,214	4,162,597	179,052,471	183,215,068	2,724,670	185,939,738	11,651,476	

* At declared calorific value—viz., 500 B.Th.U. per cubic foot.
† Including 12,615,133 thousands of carburetted, &c., water gas.
§ At actual calorific value—viz., 503 B.Th.U. per cubic foot.

NEW SHOWROOMS AT SOUTHPORT.

A CORNER OF THE NEW SHOWROOMS.

New showrooms of the Southport Corporation Gas Committee, in the Cambridge Arcade, were formally opened on Tuesday, the 26th ult., by the Mayor (Councillor E. Hadfield), who unlocked the door, and asked the assembly to join him in an inspection of the premises. He wished the undertaking every success. Following this the company adjourned to the

Mayor's Parlour, where a little speech-making took place, after light refreshments had been served.

The MAYOR said he thought they would all be delighted with these showrooms. Whatever expenditure the Committee had gone to had been amply justified; for their first idea was to attract attention, and this had already been accomplished. This would bring about extensive sales. He thought the Engineer (Mr. John Bond) had shown them in those premises that they could get a beautiful light from gas. The gas-works had made very big strides. It was seventy-five years since the gas-works were started in Eastbank Street at a cost of about £3500. After 25 years they removed to Crowlands, where the works cost £40,000; and now their capital was something like £400,000.

Alderman E. TROUNSON (the Chairman of the Gas Committee) presented the Mayor with a silver-gilt replica of the key with which he had opened the showroom door. He went on to say that they had reached a stage to-day which had placed the gas industry—he embraced all branches of it, power, lighting, and heating—in a very high position. Some fourteen months ago they held an exhibition in Southport which resulted in over 1000 gas appliances being sold. They repeated the exhibition in November last, and again they sold over 1000 appliances. Since that time they had been taking as many as 60 orders a day for cookers and fires. The result was that now they had the whole of their available staff out fixing cookers and fires, together with the assistance they had called in of 32 ironmongers and plumbers outside their own works. He moved a resolution of thanks to the Mayor for opening the showrooms, and added that for all that had been done 99 p.ct. of the credit was due to Mr. Bond. All who knew Mr. Bond and his work respected and admired him.

HOW TO MEET THE ELECTRICITY DEVELOPMENT SCHEME.

By the EXECUTIVE CHAIRMAN of the "B.C.G.A."

[Reprinted, by the courtesy of the Editor, from the "B.C.G.A." Bulletin.]

If the Government carry a scheme for the standardization and development of the supply of electricity throughout the country on lines approximating to those laid down by Mr. Baldwin in his recent speech at Birmingham—there is much virtue in an "if," we know; but it is wiser, in framing policy and plans for the future, to assume the possibility to be a probability or a certainty—how is the gas industry to meet the situation? Certainly, without any sense of despair or panic; certainly, furthermore, with firm faith in the future of the industry as the main supplier of smokeless and labour-saving fuel for all domestic and industrial processes entailing the use of heat—a faith based alike upon scientific knowledge and practical experience—certainly with a recollection of many much older, but as yet unfulfilled, prophecies of the extinction of gas by electricity; and certainly, most of all, with a determination not to be lulled into a false sense of security by past achievement and progress, but rather to be stirred to fresh activities and further progress by the stimulus of the threat of increased competition.

The worst enemies of the gas undertakings of this country are not its competitors; nor the political patrons of its competitors; nor the fanciful pictures painted by them of the electrical transformation of our domestic, industrial, and urban lives; nor the temporary hopes that may be created thereby in the public mind. The worst enemies of the gas industry are the apathy, the commercial lethargy and ignorance, and the self-satisfaction that exist in all too many quarters. That is plain, and not polite, speaking, but it is based on knowledge of the facts; and the present is no time for blinking them. Far too few gas administrators and officials yet realize that the only sound and dependable foundation for any business is the complete confidence and goodwill of the customers it supplies, based upon their entire satisfaction with the goods and service they receive.

We have all got to realize, and constantly to remember, that only those customers who deal with us gladly and cheerfully are likely to stick to us when a competitor comes along able to approach us in the value for money he can give. Those who have dealt with us only because they could not get a reasonably satisfactory alternative, but with a more or less conscious dislike for us and our methods and manners in their hearts—in most cases never freely and openly expressed—will gladly try an alternative service when opportunity offers, even at the risk of its costing a little more.

How many gas undertakings are really popular with their customers? How many gas undertakings know in detail whether they are popular or not? How many gas undertakings act consistently on the principle of studying their customers' requirements and interests in every detail, and doing everything in their power to meet those requirements and serve those interests (including the supply of only first-class, efficient fittings and appliances)? How many are employing and training an adequate staff capable of giving all the service to all their customers that such a policy necessarily involves?

Yet none of them can feel perfectly safe of weathering satisfactorily, and ultimately profiting by, the growing competition of electricity that the future certainly holds for them, except those who have not only adopted such a policy in principle, but have applied it thoroughly in practice; and this, we would emphasize, is impossible without an adequate and competent staff, far larger and far more capable than is contemplated by many undertakings who have adopted in principle the policy of "good service," and flatter themselves that therefore all is well.

Are any readers feeling restive or annoyed at the critical attitude assumed in these remarks? They would forgive the writer if they saw the correspondence or heard the conversations that reach 28, Grosvenor Gardens all too frequently. Many gas undertakings undoubtedly live in a fool's paradise because they "get very few complaints from consumers." A perfectly true story may awaken such, if it reaches them. An officer of a London gas company spent his holidays in a country town in England where the gas supply failed entirely twice in the fortnight he was there; and he was told it was quite a common occurrence. The man in charge of the works stated quite seriously that "they had very few complaints from consumers!" That, of course, is an extreme and rare instance; but there are many others only a little less bad.

The fact is that we ourselves have got to be the most critical judges of our own service to the public, and not rely upon them to tell us of our shortcomings. They will very generally believe that we are doing the best we can; and even if that "best" be bad, or even very bad, will just put up with it until they can get something better—and very little longer. Let us all make sure that we are not being merely tolerated by any of our customers for lack of a better alternative that might yet come along and, to our surprise, be heartily welcomed. Toleration is a very poor substitute for the goodwill that is the only safe and lasting foundation for business.

The introduction of electricity proved a blessing in disguise to the gas industry as a whole. It made those engaged in it realize, very many of them for the first time, that they were engaged, not in conferring a favour upon a public they treated with scant courtesy, but in selling goods that would be judged on their merits, just like other domestic and industrial commodities—that, in short, they were in trade, with customers to satisfy. The further development and standardization of the electrical industry will prove an even greater blessing, if it arouses everyone in the gas industry to the fact that even a satisfactory supply of good gas, be that forthcoming never so constantly, will not win and hold the custom of the community, unless accompanied by complete and satisfactory service, and unless that service is made known to the customer by persistent publicity of all kinds, local and national. Upon the extent to which that fact is realized, and upon the thoroughness with which it is acted upon during the next five years, the future prosperity of the gas industry depends.

We are not pessimistic, very far from it; but clear thinking and hard work, as well as optimism and faith, are the needs of the immediate future.

Eastern Counties Gas Managers' Association.—The Hon. Secretary (Mr. W. H. Mainwaring) asks us to intimate that the spring meeting of the Association will be held at Ipswich, under the Presidency of Mr. Frank Prentice (Engineer and Manager of the Ipswich Gas Company) on Thursday, May 6.

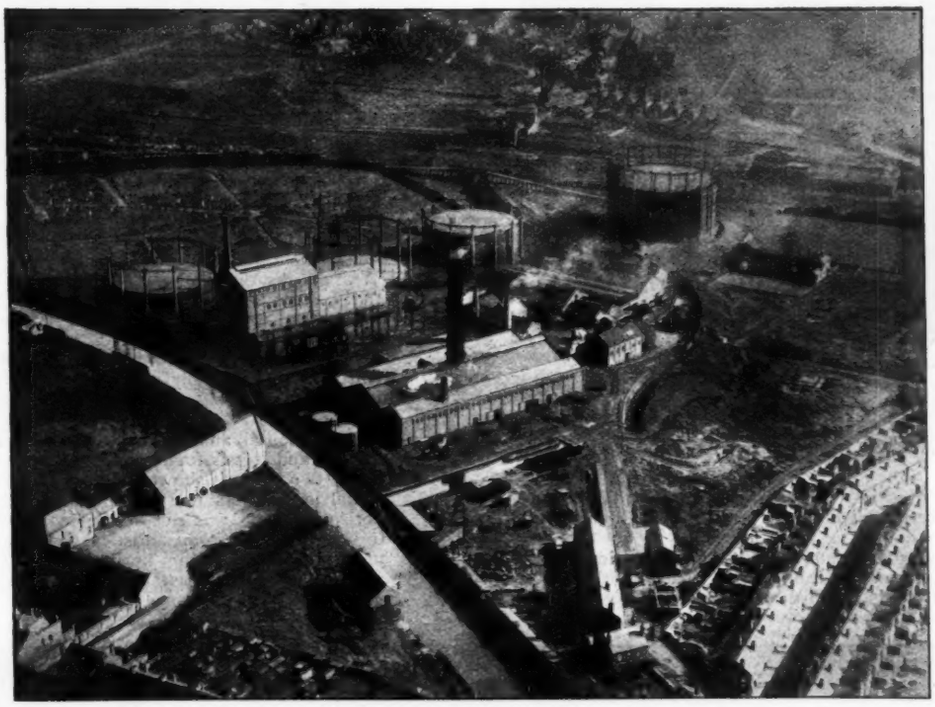
Books Received.—"Heat Transfer and Evaporation," by W. L. Badger. (The Chemical Catalog Company, Inc., New York.) "General Chemistry," by H. G. Deming; and "Materials Testing," by I. H. Cowdrey and R. G. Adams. (John Wiley & Sons, Inc., New York; and Chapman & Hall, Ltd., London.)

New Horizontal Carbonizing Plant for Huddersfield.—Messrs. Drakes Limited, constructional gas engineers, of Halifax, have secured a contract for horizontal carbonizing plant, of an approximate value of £30,000, for the Huddersfield Gas-Works. This will consist of nine beds of ten retorts, complete with coal handling plant, Drakes' patent charging and discharging machine, and coke handling and screening plant. This order has been secured in face of keen competition with the vertical system, and will be the third horizontal carbonizing plant which they have undertaken for the above Corporation. The two other installations were both of a like size and on similar lines.

GAS CENTENARY AT WALSALL.

A Prosperous Municipal Undertaking.

As was briefly intimated in the last issue of the "JOURNAL," the gas centenary at Walsall was fittingly celebrated on Monday, Jan. 25, when the Chairman (Councillor J. A. Leckie) and members of the Gas Committee of the Corporation invited a large company (which included a number of gas engineers) to an official inspection of the Pleck Gas-Works and to luncheon afterwards in the Council House. At the gas-works there was inaugurated a new horizontal carbonizing plant ; and a busy day was brought to a conclusion with the formal opening of a Gas Centenary Exhibition at the baths. The gas plant extensions were carried out to the designs of Mr. Fred Davies (the Corporation Gas Engineer and Manager), who was congratulated heartily upon his work. To commemorate the centenary and the inauguration of the new plant, Mr. Davies prepared an illustrated booklet describing the works, and giving a short history of gas generally and its particular application to Walsall. To this the writer has had recourse in the preparation of the following account of the proceedings.



BIRD'S-EYE VIEW OF THE WALSALL GAS-WORKS, 1925.

EARLY DAYS.

The meeting place was the handsome Council House of the Corporation; and here the Mayor of Walsall (Councillor D. E. Parry) in his robe of office received the visitors, and extended to them a hearty welcome to what has been described as " the town of a hundred industries." Walsall is a place of great antiquity; and, in view of the occasion, the Mayor's thoughts turned naturally to the past. It seems that Walsall had its Mayor as far back as 1377. This is the first year in which mention of a Mayor can be found in the records, though the town undoubtedly possessed a charter many years before that.

Returning thanks for the welcome, Alderman J. H. Lloyd, M.A. (the Chairman of the Birmingham Corporation Gas Committee), also dipped into the past, and congratulated Walsall on its completion of a hundred years of gas supply. He recalled the interesting fact that Mr. B. W. Smith (the late Gas Engineer at Walsall), who was happily with them that day, and himself had travelled together to Germany nearly forty years ago, to inspect a water gas plant at Essen; and he said that this early association with Mr. Smith had led him to take an interest always in the Walsall Gas-Works. He put forward an earnest plea for the closest possible co-operation in the gas industry.

HISTORY OF GAS IN WALSALL.

In 1824 an Act of Parliament was obtained by the town of Walsall, granting powers of public lighting by means of gas. Gas-works were erected by the Walsall Improvement Commissioners on a piece of land in Lichfield Street. In 1826 the works were brought into commission, and the town's gas supply commenced. The authorized capital of the first undertaking was £5000, and the population within the borough only about 12,500. The works in Lichfield Street continued to supply gas to the township until a further Act was obtained in 1848 authorizing an increase in capital to £15,000, and also the building of gas-works at Wolverhampton Street. These were erected during the years 1849-50, after which date the old works in Lichfield Street were dismantled. The progress of gas at this time was so marked that in 1876 a further increase of capital was authorized to the extent of £100,000.

In 1859 the Birmingham and South Staffordshire Gas Light and Coke Company also came into Walsall with a supply of gas; and in 1875 the rights of this Company were acquired by the Birmingham Corporation. Two years later the gas supply rights within the borough were purchased from the Birmingham Corporation in pursuance of the Walsall Gas Purchase and Borough Extension Act of 1876. Under these powers the present gas-works at the Pleck were constructed; and in 1895 the old gas-works at Wolverhampton Street were shut-down, and subsequently dismantled—a portion of the plant being retained for use as a distribution and high-pressure station only. Thus the year 1926 sees the centenary of gas supply within the borough of Walsall.

Statistics as to the gas supply before the year 1870 are unfortunately not available; but in that year the total make of gas at the Wolverhampton Street Works was only 88,000,000 c.ft., and the population supplied 48,000. The authorized capital for the year ended March 31, 1925, was no less a sum than £501,345. Since 1893 the undertaking has made in net profit a sum of £194,355, out of which £138,633 has been contributed to the relief of rates. The total income from all sources for 1925 was £167,967.

Since 1900 the Pleck Works have been subject to continuous development; up-to-date plant superseding that portion of the works which has become obsolete and inefficient, as judged by the modern ideas of economic design and construction. In fact, very little of the plant and machinery which was in use prior to 1900 is at the present time in existence. The latest addition to the plant is a new bench of horizontal retorts, situated in No. 1 retort house, and complete in every detail with coal and coke handling plant and modern electrically equipped machinery.

NEW HORIZONTAL CARBONIZING PLANT.

After a short time spent in admiring the beauties of the Council House—and particularly some frescoes presented by Councillor Leckie—motor-buses conveyed the party to the Pleck Gas-Works, for an official inspection and the formal inauguration of the new carbonizing plant. The Chairman of the Gas Committee started the electricity generating machinery, and made

Mr. Fred Davies, Engineer and Manager.

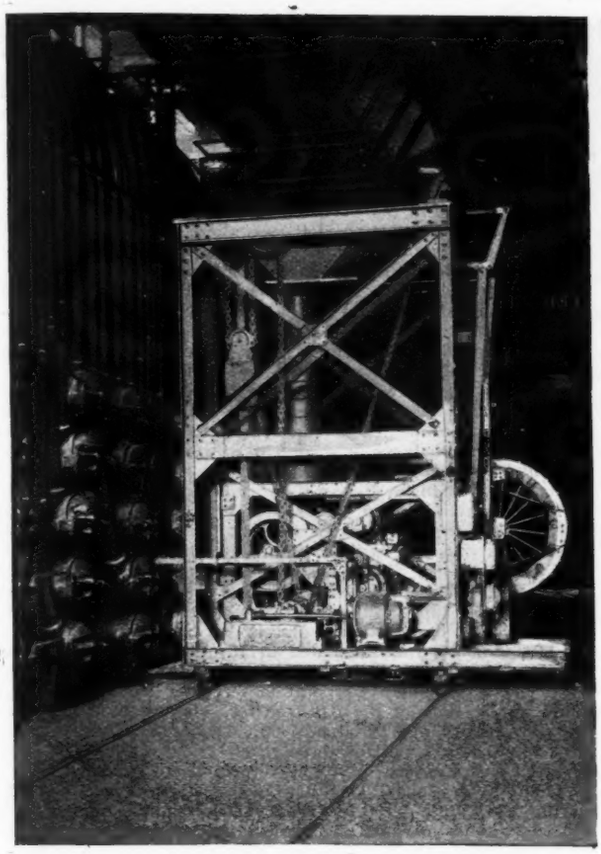
reference to the good workmanship of the contractors, as well as to his appreciation of the services of Mr. Davies in designing the lay-out.

The extensions now completed had their origin in a request by the Unemployment Grants Committee that the Gas Committee should bring forward any scheme which might in the future be considered necessary. At that time the Committee found themselves with sufficient carbonizing plant available for several years' requirements under existing trade conditions; but it was submitted to them that, in the event of the trade of the town resuming anything like normal activity, difficulty would be experienced in maintaining an adequate supply. Therefore they instructed Mr. Davies to prepare plans and specifications and obtain tenders for an installation of new carbonizing plant sufficient to render the undertaking safe for many years to come. After much deliberation, they decided to take the Engineer's advice, to put down a horizontal retort installation as nearly up to date as the circumstances and site of the operations would permit. The main considerations which led to this decision are set forth in the booklet as follows:

1.—That the laying down of a second vertical installation on the site originally decided upon when the first vertical installation was installed would make the subject of mechanical coke handling an extremely difficult one.
2.—The capital cost of such a vertical installation, compared with one of the horizontal type, was considered to be prohibitive.
3.—That the cost of maintenance with a horizontal carbonizing plant was thought to be considerably less than that of a vertical plant.
4.—That the labour charges in connection with the running of a horizontal plant constructed on modern lines are certainly not greater than that of a similar sized vertical installation.
5.—That with horizontal retort carbonization a wider range of coal selection is available to the Committee, thus enabling the undertaking's requirements to be purchased in the most advantageous markets.
6.—That, under normal trading conditions, the Borough of Walsall absorbs, at remunerative prices, all the coke that can be produced by the undertaking; and, further, that the quality of coke most appreciated by the local consumers of this commodity is a good hard grey coke.
7.—That the coke produced from a horizontal installation will stand considerably more handling, and will weather better on stocking, than that produced in vertical retorts.
8.—Both horizontal and vertical retorts were in use on the works; and it was found that the net cost of production of the two systems showed slightly in favour of the horizontal installation, in spite of the fact that the existing horizontal plant was not of the most efficient type.
9.—It was observed from statistical information that those undertakings operating horizontal retorts were, on an average, producing gas at less cost than those operating under the vertical system.

COUNCILLOR J. A. LECKIE SWITCHING THE GENERATING PLANT INTO OPERATION.

(On his left is the Mayor of Walsall.)



Jenkins' Stoking Machine.

10.—A further argument in favour of the horizontal carbonizing was the fact that the technical control of this system is of a much more simple character than that appertaining to vertical retorts.

11.—That with the horizontal installation, as designed, both the coke and coal handling plants were arranged in such a manner as to serve the vertical installation, thus cutting-down the cost of production on that plant, without increasing the capital expenditure.

The work was split-up into several sections; and the following firms were responsible for the construction of the portions named:.

BOSTOCK & HARGROVE, LTD., Wolverhampton.—Electrical equipment.

ROBERT DEMPSTER & SONS, LTD., Elland.—Coal handling plant.

GIBBONS BROS., LTD., Dudley.—Telpher coke plant.

W. J. JENKINS & CO., Retford.—Stoking machinery.

STANDARD FURNACE AND SETTING COMPANY, Southport.—Retort bench brickwork.

WALKER BROS., LTD., Walsall.—Retort house steelwork.

WESTWOOD & WRIGHTS, LTD., Brierley Hill.—Retort bench ironwork.

DETAILS OF THE INSTALLATION.

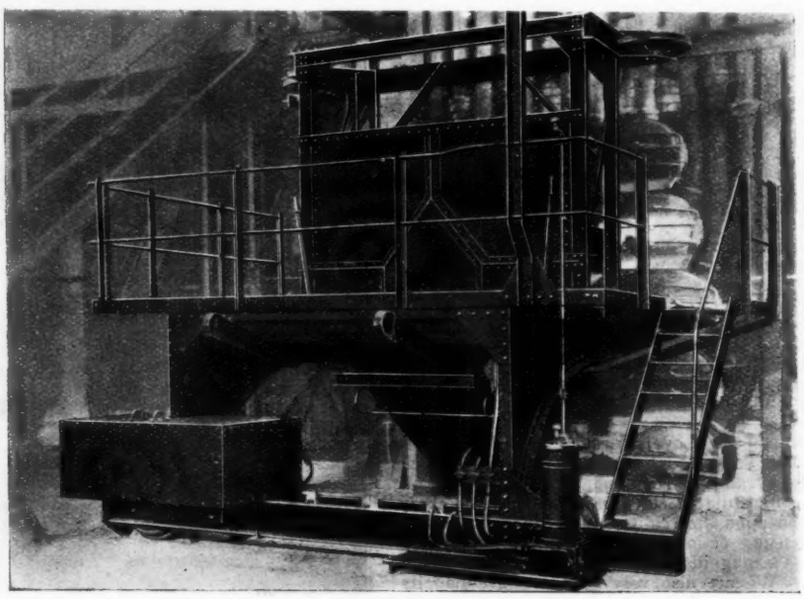
The design and layout of carbonizing plant on fresh foundations in a new building may present few difficulties; but when the plant has to be designed in such a manner as to be efficiently accommodated in existing buildings and on existing foundations, utilizing, on the score of economy, as much of the material as possible found on the site, many obstacles are met with which can only be got over by very careful thought and scheming. It was the latter condition of affairs which prevailed in No. 1 retort house, in which the Committee decided to instal the new plant.

The coal is brought into the retort house by end-tipping wagons, and is automatically tipped by electrically-driven hydraulic rams into a primary hopper, which is capable of holding about 15 tons. From this hopper the coal is screened, and that requiring to be broken is passed through the coal crusher, and from this point into the gravity bucket elevator and conveyor, which traverses from side to side of the top of the bench, on to a similar conveyor running longitudinally along the entire length of the newly-erected coal bunkers. In the design and setting-out of the coal handling plant every provision was made for extending this longitudinal elevator, should it be desired, in such a manner as to render it capable of feeding the existing vertical retort range; and the Committee subsequently decided to complete the scheme, and to make the plant serve both the new and the old installations. This will represent a very considerable saving to the department in the cost of coal handling.

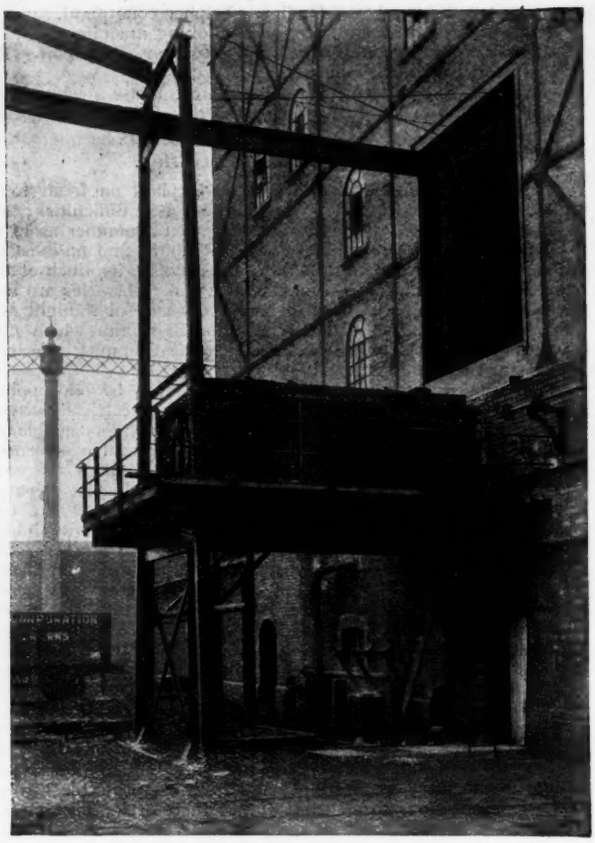
The overhead storage hoppers have outlets at the bottom immediately opposite to each tier of retorts. By gravity the coal falls from these outlets through a coal valve into the telescopic shoot to the charging machine, and from the projector belt of this apparatus it is thrown into the 20 ft. retorts. The retorts themselves are composed of 97 p.ct. silica constructed in segments, and the whole of the settings, from the furnace arch, is carried out in this material.

The stoking machine charges and discharges the retorts; the red-hot coke falling into skips, each skip capable of holding the discharge of two retorts, or about 25 cwt. of hot coke. The skips are then hoisted by means of a monorail telpher, and taken outside the house, where the coke is quenched in a suitably-designed dipping tank. From this point the coke can be put into stock to a very considerable height, accommodation having been provided for storage of upwards of 4000 tons without any second handling.

The telpher track is designed in such a manner as to enable the refuse and ashes from the producer furnaces to be handled by the same machinery, thus saving a considerable amount of expense. At the canal end of the telpher track is placed a trip rail and spare cab-house, so that in the event of the breakdown of one of the operating cabs of the telpher the spare one can immediately be brought into requisition. It will also be possible, if found necessary later on, at a small expense, to



COKE BUS.—ROBERT DEMPSTER & SONS.



Coke Quenching Tank.—Gibbons Bros., Ltd.

extend the telpher track so as to secure storage accommodation for 5000 to 6000 tons of coke, also without second handling.

On the withdrawal side of the retort bench has been provided a coke-bus of novel construction. The object of this is to feed red-hot coke into the producer furnaces, and also to ease the drop of the coke coming from the higher-tiered retorts, thereby effecting a minimum of waste in this direction.

The whole of the plant is electrically operated; and as the telpher and the stoking machinery require direct current for this purpose, two generators are installed in a motor house. Advantage was taken of this building to centralize as far as practicable the electrical control on the works; and a complete works switchboard was erected to effect this end. All the electrical energy used in the retort house is by this means controlled from the one position, which renders cost of supervision extremely low.

The total cost of the installation is in the neighbourhood of £27,000, and the productive capacity of the plant 1,600,000 c.ft. a day.

MANUFACTURING STATISTICS.

Year ended March 31, 1925.

Coal gas made	637,619,000 c.ft.
Water gas made	32,766,000 c.ft.
Total gas made	670,385,000 c.ft.
Coal carbonized	45,107 tons.
Oil used in C.W.G.	53,478 galls.
Coke available for sale	18,719 tons.
Tar made	475,219 galls.
Sulphate of ammonia made	653 tons.
Mileage of mains	107 miles.
Sold per mile	5,897,000 c.ft.
Population in statutory area, about	115,000
Ordinary meters in use	10,285
Prepayment meters in use	11,327

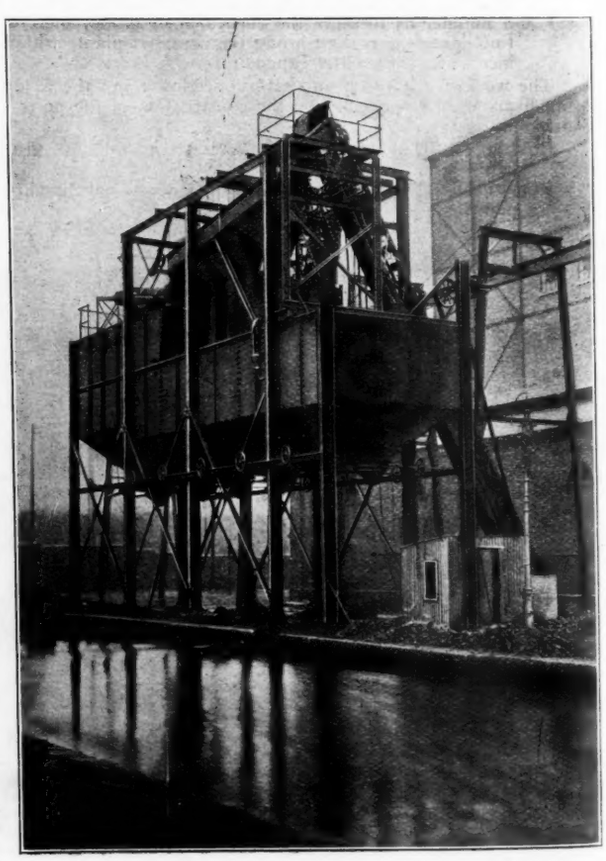
LUNCHEON.

On the invitation of the Chairman and members of the Gas Committee, a large gathering assembled for luncheon in the Council House—an enthusiastic function over which Councillor Leckie presided.

After the honouring of the Loyal Toast, Councillor ENOCH EVANS submitted "The Town and Trade of Walsall," to which response was made by the MAYOR and Mr. W. PRESTON, M.P. The Mayor congratulated the Chairman and members of the Gas Committee upon the really wonderful works which they had had the pleasure of inspecting that morning. "We have," he declared, "a magnificent gas undertaking, of which we are very proud. We are also very glad to have had its help in relieving the rates and maintaining them at a comparatively low level." He also made reference to an interesting statement regarding one of his predecessors which appeared in the souvenir booklet—namely, "that the first prepayment meter was invented by the late Alderman R. W. Brownhill, at one time Mayor of Walsall." Councillor Parry is associated with the Corporation Electricity Committee, and he put in a plea for some sort of co-operation between the two undertakings, in order to prevent overlapping. Mr. PRESTON expressed himself as highly optimistic with regard to the future—"with a good spirit between master and man, we shall go forward. What is wanted in industry is the Locarno spirit."

Mr. J. FERGUSON BELL, J.P., acquitted himself well of the pleasant duty allotted to him of proposing "Success to the Gas Undertaking of the Borough." He quoted figures to show the soundness of the position occupied by the undertaking, and its importance to the town as a revenue producer and a provider of employment. It had, he said, been wisely administered for many years. The late Mr. Tindall served the town of Walsall faithfully and well. That gentleman was succeeded by Mr. B. W. Smith, who was a well-known gas engineer in the Midlands, and had been the means of keeping these works up to date. Enthusiastic endorsement was accorded Mr. Bell's expression of gladness at seeing Mr. Smith among them that day, and his wish that for many years to come he might continue to enjoy his well-earned retirement. Mr. Bell pointed out that, when Mr. Smith resigned, the Gas Committee had been wise enough to appoint in Mr. Smith's place his Chief Assistant, who had then proved his worth and capacity, and had since justified the most sanguine expectations of all who knew him. The works they had just inspected reflected the greatest credit upon all connected with the undertaking. It may, perhaps, be added that Mr. B. W. Smith succeeded Mr. J. Tindall (who was appointed in 1870) in the management in 1900—retiring himself after 23 years' service. Mr. Smith is an old Birmingham Corporation servant. He was, indeed, there at the time of the gas transfer. Before that, he was with Mr. Kirkham at Fulham. Mr. Davies was Assistant to Mr. Smith at Walsall for three years, prior to which he was at the Linacre Works of the Liverpool Gas Company. The installation of Woodall-Duckham vertical retorts was erected during Mr. Smith's Engineership at Walsall; the roof of the old retort house in which the verticals were placed being raised to accommodate them. The new horizontals replace old horizontals; the two systems having in the past been worked together. In concluding his remarks, Mr. Bell paid well-deserved tribute to Councillor Leckie and the members of the Gas Committee.

In his reply, Councillor LECKIE denied any title to thanks; saying that he had only occupied the position of Chairman of the Gas Committee since November last, and that it was his



Coke Breeze Washing and Screening Plant.—G. Waller & Sons.

INTERESTED VISITORS VIEWING THE COKE BUS.

predecessor, Mr. Warner, who should have the credit of working for some years for this scheme. Proceeding, he made allusion to the long and faithful services of the Engineers already mentioned, and particularly to the excellent work done by Mr. Davies in himself drawing-up the scheme for the new carbonizing plant. "Mr. Davies," said the Chairman, "is well deserving of congratulations, which I tender him on behalf of the Gas Committee."

Councillor W. D. FORSYTH submitted "Our Guests"—expressing regret that Alderman Lloyd had had to return to Birmingham, and that Mr. F. W. Goodenough had been detained in London. In reply, Mr. W. M. MASON (the Manager of the "B.C.G.A.") expressed, on behalf of Mr. Goodenough, his regret that important business in London had prevented his being present. Mr. Mason said they all regretted Mr. Goodenough's absence, as the opportunity would have been a fitting one for gas men in the Midlands to congratulate him on the high and well-merited honour which had been bestowed upon him. Mr. Mason contrasted the early and difficult days of the gas industry with the strong position it had gained, not by political favour, but by the merit of its good service and ability to meet national, communal, and individual needs. Given a fair field, gas had great possibilities of future development.

The "Father of the Gas Committee," Alderman COPE, J.P., proposed "The Contractors;" and this was responded to by Mr. J. W. BROADHEAD (Managing Director of Messrs. Robert Dempster & Sons), on behalf of his own and the other firms concerned. He wished continued success to the gas undertaking; and said the contractors were quite satisfied that what Mr. Davies had promised would not only be achieved, but would be exceeded. The way Mr. Davies had worked-in the whole scheme to suit the surroundings and the circumstances was excellent. The contractors had tried to give the Corporation of their best; and he believed they had succeeded. Nothing but the best would satisfy Mr. Davies.

GAS CENTENARY EXHIBITION.

Further to celebrate the centenary of the undertaking, the Gas Committee arranged a useful gas exhibition to run during the week—thereby not only marking the successful close of the first hundred years' working, but giving a good "send-off" to the second century. The exhibition was housed in the Baths, in Tower Street; and was formally opened on the Monday afternoon, following the luncheon, by Councillor Leckie. Mr. F. W. Goodenough had been expected to perform this ceremony; but, as already remarked, urgent business in London prevented him from attending, and the Chairman of the Gas Committee took his place. Councillor Leckie referred to the honour of "C.B.E." which had been conferred upon Mr. Goodenough in recognition of his great work in connection with the Wembley Gas Exhibit, and asked Mr. Mason to convey to him their hearty congratulations. They started their second century, he added, with every confidence that at the end of this period gas would still be well to the fore. He acknowledged the indebtedness of the Committee to those firms who had co-operated with them in promoting the exhibition. The Mayor proposed a hearty vote of thanks to Councillor Leckie for opening the exhibition, and for the kind hospitality they had enjoyed at his hands. This was seconded by Mr. Mason, who dwelt upon the importance of smoke abatement, and the invaluable aid rendered by gas in the abolition of domestic drudgery. The vote was supported by Mr. Preston, and cordially passed.

Features of the exhibition, to which admission was free, were daily cookery lectures and demonstrations by Mrs. Dora Rea, school competitions in cooking and ironing, and a competition in estimating the weight of an immense block of Derbyshire coal from the Butterley Collieries. The main lighting inside the exhibition was by 16 1000-C.P. Keith high-pressure lamps; while outside there were three similar lights. These were served by a Keith-Blackman compressor, driven by a "National" gas engine. Other lighting fittings were by Evered & Co. (with their new switch), Best & Lloyd, Marsh, and Catterson. The new patent "Positivact" distance gas lighter of Messrs. Evered & Co., Ltd., is the latest device for lighting gas burners from a distant switch. The action, as the name denotes, is positive—*i.e.*, it operates directly on the plug of the gas cock—and precludes any possibility of uncertainty. By turning the switch-handle, the stress on the steel cable is taken and automatically released, and the operation of turning-on the gas is completed. By turning the switch-handle in the opposite direction, a similar operation takes place, and the gas, save for the by-pass jet feed, is completely cut-off. The action being entirely automatic, the gas cannot in either operation possibly be left partially on. In the hands of inexperienced persons, this is a point of importance. The "Positivact" distance lighter is adaptable to the down-rod of any pendant for one or more lights, shade lights, semi-indirect bowl fittings, and hall lanterns. It is also supplied with a suitable metal covering (made in two parts so as to allow of easy access for adjustments), which entirely encloses the mechanism, and gives a very pleasing ornamental finish to the pendant.

The Corporation Gas Department themselves had three stands—a well-arranged chemical display, and fitted kitchen and bathroom. The kitchen was provided with a General Gas Appliances cooker, a Wright "Hotwell" water heater, a Cannon washboiler, and a Fletcher Russell hand iron. In the bathroom were a Parkinson "Treasure" geyser, a Fletcher Russell lavatory basin water heater, a General Gas Appliances gas fire and radiator, and Evered combined gas lighting brackets and shaving pot and curling iron heaters. These and the following individual stands all made excellent displays, which are bound to influence favourably the gas consumption of Walsall.

The Cannon Iron Foundries, Ltd., showed, in addition to cookers, several patterns of their inclined gas fires. These fires are constructed on the new inclined principle with sloping radiants, thus directing the heat towards a person's body and face, in addition to the feet. The burner consists of two parts only, and is not fitted with steatite or other fragile material. The injector is most simple, having only three parts, but is exceedingly efficient, and there is said to be no "hiss" or "whistle" when adjusted, whatever the quality or pressure of gas may be. Silence in burning and small consumption of gas are special features. There is no smell, all requirements of hygiene being claimed to be perfectly met. Another speciality was the firm's "Belle" radiator, without flue, and fitted with an argand burner, glass chimney, and copper reflector.

The stand of General Gas Appliances, Ltd., included their "Triumph" and "Dainty" raised-level cookers, and their

"Cheeru" and "Warmu" gas fires. The "Warmu" fire is fitted with a curved duplex burner, together with improved brick and fuel; the idea of the latter being to increase the resemblance to a coal grate. It fits into an existing grate. With the "Cheeru," the same principle is embodied in an attractive gas fire front, as a self-contained gas fire, to stand in front of an existing coal grate.

The Parkinson Stove Company, Ltd., displayed different designs of their hygienic gas fires, which are the outcome of prolonged research into the requirements of house warming. The "Bournemouth," "Harrogate," "Stechford," and "Kennington" are new attractive patterns for the coming season; and it is pointed out that their refined ornament makes them eminently suitable for light schemes of decoration. These are only a few of the styles to which the firm drew attention, together with their cookers and gas-heated steam radiators.

Messrs. John Wright & Co. had on view an excellent selection of domestic cooking and heating apparatus, including the "New World" and "New World Junior" cookers, and a "Kenilworth" fire, in handsome bronze finish. There were also a sugar boiler, for sweet making, provided with a high-power burner; and a new self-controlled, gas heated confectioners' and bakers' oven, fitted with the well-known "Regulo" automatic heat controller. This oven is double cased and packed throughout. Two grid shelves are utilized for baking small things; while 2-lb. loaves can be baked on the second shelf, if the top one is removed. It is a well-made article, which should prove of great utility.

It should be added here that specimens of the fires specially referred to above were in actual operation; while cookers by the four firms named were installed in the lecture hall, for use during the demonstrations.

COKING OF COALS.

Proposed Standard Method for the Determination of the Agglutinating Value of Coal.

[Abstract of a lecture by M. Barash, M.Sc. (Tech.), A.I.C., of the Research Department, West's Gas Improvement Company, Ltd., before the Manchester Section of the Society of Chemical Industry on Jan. 8.]

COKING AND AGGLUTINATING POWER.

A coal which contains the highest proportion of agglutinant—*i.e.*, of β and γ compounds, to which the coking of coal is now fairly definitely attributed—does not necessarily form the best coke under ordinary conditions of carbonization. It may be taken that any coal is composed of two portions—the smaller being fusible and giving a cellular and more or less vitreous mass on destructive distillation, and the larger being infusible, and in this connection often termed "inert matter." These two fractions do not necessarily form a perfectly homogeneous mixture in the coal mass.

The author hopes to establish fairly conclusively, in matter which he has for publication in the near future, the following facts:

(1) It is impossible by any method at present available to determine the amount of cementing compounds (as represented by the proportion of fusible substances) in the coal, as we cannot determine to what extent they are affected (increased or diminished) during attempts to separate them from the infusible compounds in the coal.

(2) Similar difficulties arise with regard to the determination of the strength and covering power of the cementing material.

(3) The so-called "inert matter" exerts a remarkable, and hitherto unsuspected, influence on the manifestation of agglutinating properties by the cementing material of the coal.

Particular stress is laid on the last of these observations, as the author is convinced that the nature of this infusible material is perhaps the most important factor in determining the quality of the coke produced during carbonization. A considerable amount of evidence has been accumulated in support of this theory, and was commented on by Mr. Barash in his winning essay on "Coke Production" published in the Coke Competition number of the "JOURNAL," Nov. 9, 1925, pp. 17 to 27.

INFLUENCE EXERTED BY INERT MATTER.

During the progress of carbonization, the molten cementing material affects the mass of coal in three ways:

(1) It largely contributes to the cellular and more or less vitreous structure and appearance of the coke, produced by the rapid evolution of gaseous products from both fusible and infusible portions of the coal.

(2) It functions as a binding medium for the particles of infusible material.

(3) It is rapidly absorbed into the pores of the infusible material.

It is mainly the relative porosity or absorptive capacity of the latter which governs the amount of cementing material which will be left available for binding the coke mass. This property of the infusible material can readily be affected by treating the coal. The extent of this alteration in property is dependent on whether the treatment (chemical, heating, weathering, &c.) is mild or drastic, short or prolonged, but always results in an increase in porosity, a consequent diminution in the amount of the agglutinant available for binding together the mass, and therefore a decrease in the agglutinating value of the coal. The agglutinant itself appears to be extremely stable.

MAKING COALS PRODUCE BETTER COKES.

The inert matter of some coals absorbs comparatively little agglutinant. In such cases the fusible material may be greatly in excess; and these coals yield weak friable cokes if carbonized alone and in their natural condition. They may, however, be made to yield better cokes by several processes, which may be grouped into three classes:

(1) Removal or destruction of part of the agglutinant.

(2) Weathering, chemical, or other special treatment before carbonization, to alter the condition of the infusible matter.

(3) Blending with a non-coking coal, coke breeze, charcoal, &c.—*i.e.*, a material deficient in, or devoid of, agglutinant.

The first method is difficult to carry out, and is wasteful. The second is also wasteful, but there are cases where it cannot be avoided—*e.g.*, where blending material is not economically available. Blending is not only desirable from the aspect of the most efficient utilization of the valuable properties of highly agglutinating coals, and economically sound from the industrial standpoint of utilizing poorly-coking or non-coking materials, of which tremendous quantities are available, but should be insisted upon from the point of view of conserving our highly coking coals, which are being rapidly consumed.

The author claims that, from an examination of the agglutinating properties and coking propensities, by the laboratory methods described in his paper, the value of a coal, and its availability for blending under specified carbonizing conditions, can be determined.

DEFINITIONS.

Mr. Barash defines the "agglutinating power" of a coal as the cementing property of that coal as manifested in the production of a coherent coke on carbonizing a mixture of the coal with (*a*) another coal which, carbonized alone, would give a non-coherent coke, or with (*b*) some inert matter such as coke breeze, charcoal, anthracite dust, &c. The "agglutinating value" is a quantitative or numerical measure for comparison of agglutinating power. This value is of use in distinguishing broadly three classes of coals. Those with a low value will produce a poor coke, and should be enriched before carbonization; coals with a medium value may be carbonized alone; and those with a high value should have this excessive quality utilized to its maximum.

The "coking power"—an industrial expression—is defined as the property of that coal of producing a more or less coherent coke on carbonizing it alone. The term "coking value" should be used to signify a numerical index of the strength of the coke produced under specified standard conditions; the strength of this coke to be determined also in some specific manner.

The author strongly deprecates the employment of the terms "caking power," "caking value," and "caking index." He thinks that "caking" should be applied only in such processes of segregation (such as by compression, cold cementation, baking, &c.) which do not involve the common processes of carbonization, and should not be used at all in the coking industry and in literature dealing with coking.

After a review of the methods proposed up to the present for the determination of agglutinating value, the author comes to his own method, which is the outcome of a critical survey of former procedure, coupled with personal experimental and industrial investigation. An attempt has been made to render all the details of the determination easily standardizable, and devoid of complications which could militate against their adoption for both scientific research and industrial application.

In developing the method, four coals used for the research were selected as typical representatives of the Lancashire coalfield—viz., Arley, Mountain Mine, Yard (Bickershaw), and Ravine (Abram).*

The method has subsequently been applied to the examination of a variety of coals from many districts, and has proved its universal reliability in the classification of coals for in-

* For description, industrial application, and analyses of these coals, see Appendix I. to the paper on "Coke Production" in the Coke Competition number of the "JOURNAL," p. 24.

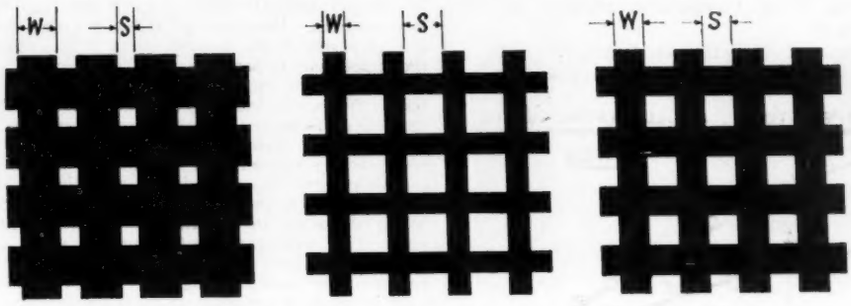


FIG. 1.—COMPARISON OF NON-STANDARD AND I.M.M. STANDARD SIEVES.

dustrial purposes, particularly from the point of view of gas-works practice.

SUMMARY OF METHOD.

The coal sample is ground (by degrees) to pass completely through a 90-mesh (" I.M.M.") sieve with the production of as little very fine powder as possible. The inert material (electrode carbon) is ground to pass through a 60-mesh (" I.M.M.") sieve, and the portion is retained which remains on a 90-mesh sieve. Quantities of coal and 60-90 electrode carbon are weighed out so as to give a total of 2 grammes (or slightly more) of mixture. They are thoroughly mixed, and two 1-gramme lots of the uniform mixture are weighed into separate silica tubes, approximately 2 in. long by ½ in. diameter (internally). The two tubes and contents are treated in exactly the same way, and serve as duplicates for checking the uniformity of the mixture.

Each tube with its contents is heated for exactly five minutes at 800° C. in an electrically-heated (platinum-wound) silica furnace. A small silica crucible with its curved under-surface resting on the rim of the tube acts as a lid, and also rests on top of the silica furnace, so that the tube and contents are completely immersed in the heating apparatus at a constant temperature. The tube is transferred, for cooling, to a desiccator (being kept throughout in a vertical position), and then carefully inverted, and the coked residue is allowed to slide out on to a polished metal scoop. The proportion of powder is noted, and the coherent mass (if any) tested for comparative crushing strength with the fingers. This procedure is repeated with mixtures containing varying proportions of electrode carbon until the minimum ratio of the latter to coal, which gives a non-coherent powder, is ascertained. The agglutinating value is then stated as the proportion of coal to electrode carbon ($1 : x$) in this mixture.

It is advisable that this determination should be preceded by a determination of the volatile matter evolved from the coal alone at 800° C. (in the same apparatus and by the method described in the paper referred to), so that the coke from this latter determination should be available for examination of the coking properties, and for the indication which it furnishes as to whether the coal will have a high or a low agglutinating value. Immediately after the tube has been removed from the furnace, and the degree of swelling of the coke ascertained, the weighing-out and preparation of the mixtures can be commenced. It has been found that these processes and the carbonizations can be so fitted-in that, particularly when two or more samples are being tested at the same time, the total time taken for each sample, to determine the percentage of volatile matter and the agglutinating value, and to obtain a good general indication of the coking propensities of the coal, may be reduced to approximately one hour.

The agglutinating values obtained for the four coals (at 800° C.) by the above method of determination are:

Arley	1 : 7
Mountain Mine	1 : 13
Bickershaw Yard	1 : 10
Abram Ravine	1 : 8

DETAILS OF METHOD.

PREPARATION OF COAL SAMPLE.

The whole of the sample should be ground to pass a 90-mesh sieve, with the production of a minimum of very fine particles. This is effected by grinding the sample in stages, and sifting through the sieve after each stage, returning the residue on the sieve each time to the grinding apparatus until all the sample has been passed through the sieve. It is important that the ground sample, after thorough mixing, should be carefully preserved in sealed bottles if likely to be wanted again after some time, as it is remarkable to what extent powdered coal will " weather," and so depreciate in agglutinating value.

SIEVES.

It is most important, particularly for the grading of electrode carbon, to select a standard make of sieve. Even if the number of meshes to the linear or square inch is stated, it does not necessarily define the size of the individual mesh, as different manufacturers use different thicknesses of wire in the weave of the same sieve. The most satisfactory type of sieve, from all points of view, was found to be the " I.M.M." (standardized by the Institute of Mining and Metallurgy) in which the individual mesh in each sieve is a square, with length of side equal to the thickness of the wire used. Thus the maximum size of spherical particle passing through a 90-mesh (I.M.M.) sieve would have a diameter of 1/180th of an inch. It is strongly recommended that this type of sieve be universally adopted whenever grading of finely-divided coal is necessary.

THE INERT MATERIAL.

A study of various types of inert material showed that electrode carbon is the most suitable. This material, first adopted by Sinnatt and Grounds (1920), has proved most satisfactory in use, is readily available, and has a fairly constant composition. Curiously enough, it has been described by these authors as being non-porous, or non-absorbent to the agglutinant. Actually, Mr. Barash finds it to be particularly absorbent to agglutinant, compared with the other materials suggested, and that this probably constitutes its most valuable property for the purpose concerned, in that it compares favourably with the inert matter of the coal substance, and helps to give a definite and sharp end-point in the determination. As obtained in the form of sticks, several samples of the material were found to be uniform in composition, containing over 98 p.ct. of carbon, about 1·5 p.ct. of ash, and about 1 p.ct. of volatile matter, probably due to incomplete combustion of the cementing material used during manufacture.

PREPARATION OF INERT MATERIAL.

The sticks of electrode carbon should be broken-up into small pieces, ¼ in. to ½ in. in size, and ground by degrees, as described in the case of the coal samples, so as to pass a 60-mesh sieve. The whole of this powder should then be exhaustively sieved on a 90-mesh, using only about 25 grammes at each operation. In the best circumstances of grinding and grading, approximately 30 p.ct. of 60-90 mesh particles are obtained from the sticks. This size is fairly easily prepared, gives a uniform homogeneous mixture with the " through 90 " coal powder, and gives a greater variation in values for different coals than any other grade.

MIXING OF COAL AND INERT MATERIAL.

On an average, about five tests have to be carried out for each determination of agglutinating value. It is therefore advisable to use 1 gramme of the mixture in each test, enough being made up, however, to enable a duplicate test to be made with each ratio. Accordingly, for each test, amounts of coal and electrode carbon should be separately weighed-out so as to give a total of 2 grammes, or slightly more, of mixture (*e.g.*, for a 1 : 3 mixture, 0·5 gramme of coal and 1·5 grammes of electrode carbon; and for a 1 : 20 mixture, 0·1 gramme of coal and 2 grammes of electrode carbon).

The following method of mixing gives entire satisfaction. The two materials are accurately weighed on a small counter-balanced copper scoop, introduced into a 25 c.c. glass-stoppered weighing bottle, and the latter is revolved several times in an inclined position for the preliminary mixing. The contents are then poured on to a circular polished (aluminium or copper) scoop (about 6 in. in diameter), and furrowed and turned with a spatula so as to overcome any tendency of the coal powder to segregate. The mixture is then transferred to a " shaking tube " (a strong, flat-bottomed test-tube, 4 in. by 1 in., with a well-fitting rubber stopper) and shaken vigorously, while being rotated between the fingers, for at least a minute. Finally, it is poured in a thin stream back into the weighing bottle, and from this the two 1-gramme portions are weighed on the copper scoop, and transferred to separate silica carbonizing tubes.

TYPE OF CRUCIBLE AND METHOD OF HEATING.

Regarding the type of crucible and method of heating, readers are referred to a comprehensive summary of the subject which

was published in the Coke Competition number of the "JOURNAL," pp. 24 to 27.

TEMPERATURE AND DURATION OF HEATING.

Several considerations prompted the adoption of 800° C. as the temperature at which to carry out agglutinating value determinations. Burgess and Wheeler (1910) have shown that a critical period in the decomposition of coal appears to lie within the range 700° to 800° C. All the hydrocarbons of the paraffin series, and the richer products of carbonization are evolved below this point, and further heating results mainly in the production of hydrogen and methane from the decomposition of what may be termed the "coke molecule." At the highest temperatures conveniently attained in laboratory investigations (1100° to 1200° C.) there is no indication of the limiting point being reached in the evolution of gases from coke, so that there is no advantage in adopting an inconveniently high temperature. The temperature-agglutinating value curves in fig. 2 indicate that 800° C. is a critical point in the agglutinating values of the coals investigated. The values increase regularly with increase of temperature until a maximum value is reached at 800° C. after which (*e.g.*, at 900° C.) there is a distinct decrease. Further, for economic reasons, 800° C. is particularly suitable for prolonged use. It is also well within the scope of most investigators, is a fair mean of the temperatures which have been suggested, and, above all, yields results comparing favourably with those obtained in modern high-temperature gas-works and coke-oven practice.

With regard to the duration of heating, a series of investigations has been carried out which shows that no further change can be anticipated after five minutes' heating at 800° C.

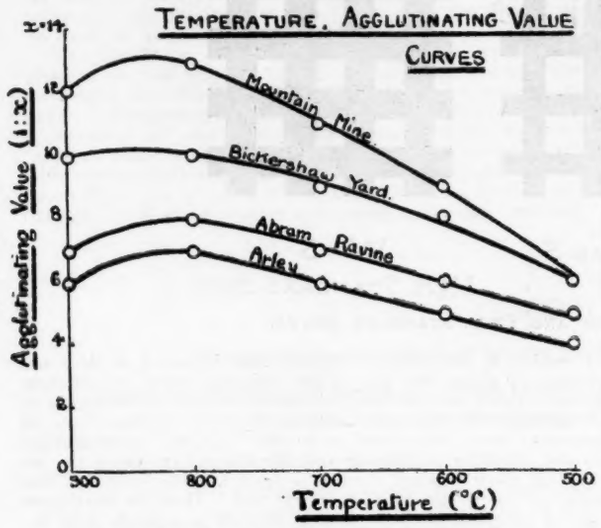


Fig. 2.—Temperature-Agglutinating Value Curves.

DETERMINATION OF END-POINT.

The majority of investigators, no doubt due to the choice of an unsuitable inert material, combine the determination of agglutinating power with a coking power test. If a non-absorbent inert material is used, the end-point—*i.e.*, destruction of agglutinating power—is difficult to determine, as a coal with a moderate agglutinating value gives some measure of cohesion even when carbonized with an admixture of fifty times its weight of sand. Such values (as determined by the Campredon, Dunn, or Sinnatt and Grounds methods), besides not taking into consideration the ambiguity introduced by the personal element in (1) the application of hand pressure, (2) the adjustment of a weight, and (3) the judgment, frequently entailed, as to whether the product from the compression test is actually powdered or not, do not account for the agglutination which is still left in the product before the application of pressure.

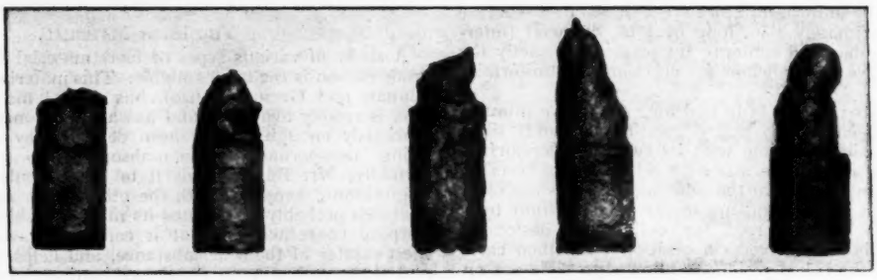


Fig. 3.—Cokes from Arley Coal.

I, IA at 900° C. 2, 2A at 800° C. 3 at 700° C. 4, 4A at 600° C. 5 at 500° C.

It has been mentioned that the agglutinating value is dependent on:

(1) The amount of agglutinant or fusible portion of the coal.
(2) The strength and covering power of the agglutinant.
(3) The absorbing action of the inert material of the coal.

None of these three factors, or their influence, can be determined individually. The weight method determines an un-

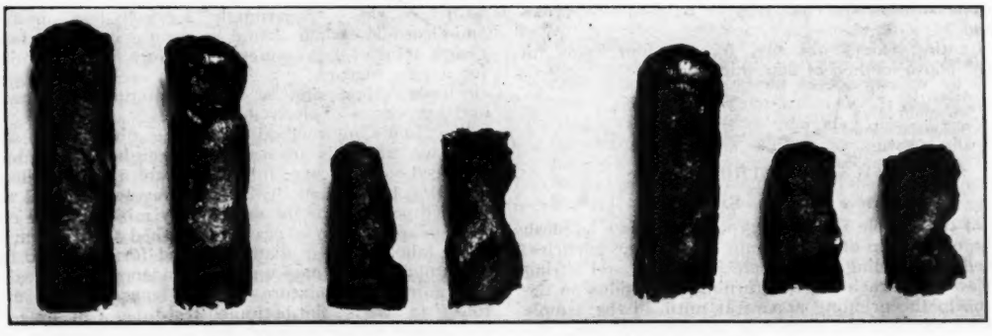
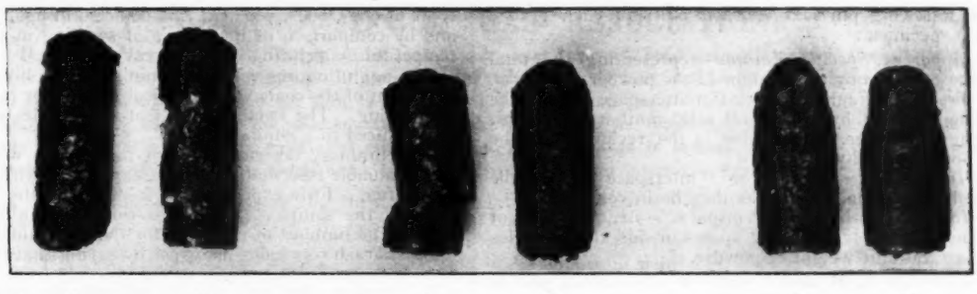


FIG. 4.—COKES FROM MOUNTAIN MINE COAL.

I, IA at 900° C. from 0·5 gram of coal
IB, IC at 900° C. ,, 0·25 ,, ,,
2 at 800° C. from 0·5 gram of coal
2A, 2B at 800° C. ,, 0·25 ,, ,,

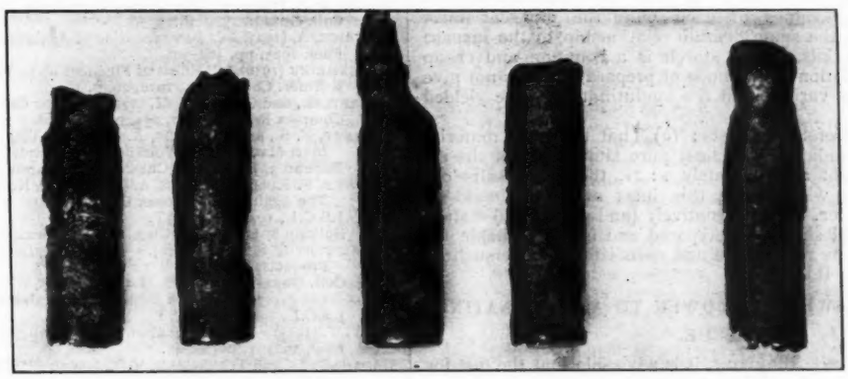


I IA 2 2A 3 3A

4 4A 5 6

FIG. 5.—COKES FROM BICKERSHAW YARD.

I, IA at 900° C. 2, 2A at 800° C. 3, 3A at 700° C. 4, 4A at 600° C. 5 at 500° C. 6 at 400° C.



I IA 2 2A 3

4 4A 5 6

FIG. 6.—COKES FROM ABRAM RAVINE COAL.

I, IA at 900° C. 2, 2A at 800° C. 3 at 700° C. 4, 4A at 600° C. 5 at 500° C. 6 at 400° C.

known fraction of the total agglutinating effect, and is analogous to a determination of the amount of strain which has to be placed on a fabric so that an unknown additional strain would produce rupture of the material.

The author proposes that the determination of agglutinating value should be carried out to its logical conclusion—*i.e.*, when the coherence of the carbonized residue has just been destroyed. The determining factor in the test is therefore taken as the minimum amount of the standard electrode carbon which, when mixed with a unit amount of coal, will give a residue, on carbonization at 800° C., consisting entirely of powder.

STATEMENT OF RESULTS.

The value expresses a ratio between two components of a mixture; and it is considered advisable to state the result of the determination in the form—

$$1 : x$$

where x is the number of parts (by weight) of electrode carbon which, when mixed with one part of coal (by weight) gives the desired end-point. This is considered preferable to the use of the bare number (x), as adopted by Sinnatt and Grounds, which may lead to confusion, particularly in tabulated results, when it may be mistaken for a percentage.

In stating results, the practice has been adopted of using whole numbers only for x.

STANDARD AGGLUTINANT FOR COMPARISON OF INERT MATTER.

From a comparative study of electrode carbon and the inert materials proposed by previous investigators, it was found that differences in chemical constitution, in the usually recognized physical properties, and in the appearance of the particles under the microscope, did not satisfactorily account for the discrepancies in the agglutinating values yielded by these inert materials. Methods were then elaborated for the determina-

tion of the following physical characteristics of each graded (60-90 mesh) specimen:

(A) *The Apparent Specific Volume*—representing the total volume occupied by unit weight of the powder.

(B) *The True Specific Volume,* or "matterspace"—*i.e.,* the volume occupied by the actual solid matter in the unit weight of powder. This value is the reciprocal of the true specific gravity.

(C) *The Interspacial Volume,* or "interspace"—*i.e.,* the space between the particles as they lie in contact.

(D) *The Inspacial Volume,* or "inspace"—*i.e.,* the total of all the capillary cavities or spaces inside the particles forming the unit weight of powder.

It was found that A, B, and C could be determined with a fair degree of accuracy; and it is evident that D may then be determined from the equation:

$$D = A - (B + C).$$

The value D was found for each of the inert materials, and determinations of agglutinating value having been carried out with each of these powders against the four coals used as standards, it was found that the agglutinating value with any particular coal is a function of the inspace of the inert material used in the test. Though this conclusion proved valuable and satisfactory, it was decided that the method of determining inspace was too elaborate and laborious for general use.

An investigation was then undertaken to find a suitable agglutinant for this standardization. Pitch and similar substances of indefinite composition were ruled out. Several sugars and natural and artificial resins also proved unsuitable. The investigation of several starches, however, gave more promising results, and a remarkable similarity was found in the behaviour of potato starch, rice starch, and "soluble" starch or carbonization, with regard both to the evolution of volatile matter (or coke yield) and to agglutinating properties. All three gave agglutinating values of 1 : 21 with electrode carbon, and the agglutinating values of each with the different inert materials showed the same definite relationship to the inspace of the inert materials. Also, starch is a common and cheap material, and variation in its mode of preparation does not give any corresponding variation in the agglutinating value yielded by the product.

The author therefore suggests: (*a*) That the inert material should first be standardized against pure starch, and if the result obtained is not approximately 1 : 21, then all results obtained with coals when using this inert material should be corrected by a factor. (*b*) Alternatively (and preferably) a standard inert material should be prepared and made available for general use by some responsible and authoritative body such as the Fuel Research Board.

RELATION OF SWELLING POWER TO AGGLUTINATING VALUE.

As mentioned in the summary, it is advisable that the test for agglutinating value should be preceded by a determination of the volatile matter evolved from the coal at 800° C. in the apparatus described. The coke cylinder gives a valuable indication of the coking and agglutinating propensities of the coal.

A coal with a high agglutinating value (above 1 : 8), and liable to produce a soft friable coke, gives a very voluminous coke cylinder, more than five times the volume of the original coal charge. A good coking coal with a moderate agglutinating value (1 : 5 to 1 : 8) gives a hard dense coke cylinder, only two to four times the volume of the coal used. A non-coking or poorly-coking coal, with agglutinating value below 1 : 5 will show a shrinkage or only slight swelling in the coke.

This generalization has proved true not only in the comparison of a large number of coals, but also in comparing the results yielded by any individual coal when treated under different conditions of temperature, or in stages by weathering, or with chemical reagents. This is well borne out by examination of the reproductions of the coke cylinders produced from the four coals at 900°, 800°, 700° C., &c., depicted in figs. 3, 4, 5, and 6, and by comparison of the degree of swelling in these with the temperature-agglutinating value curves (fig. 2).

The agglutinating value is diminished steadily by prolonged treatment of the coals with chemical solvents or reagents and by weathering. The swelling power of the samples so treated was also reduced to a similar extent.

A preliminary determination of the volatile matter not only gives valuable information with regard to the yield of coke, but also, after a little experience, a fair idea of the agglutinating value of the sample. This saves time in making up a needlessly large number of mixtures for the determination.

Mr. Barash concludes his paper by saying that the determinations have proved extremely useful not only from the industrial point of view, but also in the scientific investigation of the coking of coal and the constituents of the coal mass to which this property is attributable.

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Tank Car for Pulverized Fuel.

An illustration which has been reproduced by the "Gas Age-Record" from an advertisement in a recent issue of a certain paper, shows that the Germans have commenced to advertise tank cars for the transportation of powdered fuel. The tank car depicted has a V-shaped bottom designed to facilitate removal of the powdered fuel by compressed air. The claim is made that an air pressure of 30 lbs. will deliver the fuel to a point over 3000 ft. from the car. Suction may also be employed for the same purpose.

Adamson Tar Plant.

A source of trouble in connection with the distillation of tar is the presence of water. Firing of the tar still must be performed carefully until this has been driven off. To speed up the distillation process, and to prevent frothing troubles, preheaters are introduced in the tar plant manufactured by Messrs. Joseph Adamson & Co., of Hyde. The necessary heat is obtained from the vapours coming away from the tar stills. Such a plant is in operation at the Provan Works, Glasgow. The equipment consists of four stills, four preheaters, and six condensers, and is capable of dealing with 200 tons of tar a day. When the distillation of the tar in the still is completed, all the water which was contained in the crude material in the preheaters has been driven off. After the pitch left in the still has been run off into the coolers, the crude tar from the preheaters is fed into the still as its next charge. Working on this system, it is possible to accelerate the operations considerably. When it is stated that it takes about 28 hours for the complete distillation of a charge in a single still, and only six hours when a preheater is used, the value of preheating is evident. The Adamson tar still is a simple cylindrical vessel, 11 ft. in diameter, having a domed top and dished bottom. By removing the bricks surrounding the still at the top of the cylindrical part, the complete still may be lifted out of place, and a new one dropped into position. The amount of work in replacement is therefore cut down to a minimum.

MIDLAND JUNIOR GAS ASSOCIATION.

[In a valuable paper, Mr. J. Fallon, of the Incandescent Heat Company, Ltd., demonstrates how efficient town gas is as a fuel for industrial heating. In computing the total costs for any furnace installation, he says, the cost of fuel consumed per hour, or per shift, is by no means the controlling factor. Town gas, even though showing double the hourly fuel cost for the maintenance of working temperatures in comparison with other fuels, can in many instances be applied with commercial success to large furnaces. This is because the use of gas means a reduction in stand-by losses, low maintenance and labour costs, and lower interest on investment.]

A Meeting of the Association was held in the Birmingham Council House on Thursday, Jan. 21—Mr. J. H GEE (President) in the chair.

Congratulations were extended to Mr. George Currier, of Smethwick, upon his appointment to a new post at Leeds.

FURNACES.

By JOHN FALLON, of the Incandescent Heat Company, Ltd., Smethwick.

(Illustrated by lantern slides.)

[Extracted.]

There is no phase of industrial furnace work, from the heat treatment of small needles to steel melting, in which town gas would not give infinitely better results than are obtainable from other fuels. Cost alone is the limiting factor of its application. Its principal advantages may be summarized as follows:

1.—Low first cost of installation and ease of distribution.
2.—High convenience factor (no labour or additional costs necessary for conversion into useful heat).
3.—Accurate temperature control.
4.—Low maintenance and depreciation costs.
5.—Elimination of deleterious action of furnace gases, ash, tar deposit, &c., on surface of materials treated.

FACTORS CONTROLLING EXTENDED USE.

Reduction of costs, by way of increased furnace efficiency, greater output, or lower cost of gas, must extend its use. To this end, co-operative effort between gas undertakings and furnace manufacturers is most necessary. While I cannot speak too highly of the helpful and co-operative effort extended by the Birmingham Gas Department to both furnace manufacturers and users in all problems relating to furnace application and design, I regret that in many other industrial areas such assistance is not always forthcoming from the gas undertakings concerned. One frequently meets with an attitude of indifference, due mainly to lack of appreciation of the great possibilities in increasing output and ultimately lowering the cost of gas production by the introduction of gas-fired furnaces.

Electricity is now highly competitive with gas in the fields of lighting, power, and, to a lesser degree, heating. It behoves gas managements, therefore, to develop industrial furnace heating by intense application to this important problem. By utilization of the most efficient and suitable furnace, and for outputs ranging up to 200,000 B.Th.U. per hour (equivalent to the heating of 10 cwt. of steel to 800° C.) town gas will, in most instances, give better all-round commercial results than are obtainable with other fuels, or by electrical resistance furnaces. The leading fuel oil companies are keenly alive to the importance of furnace heating as an outlet for their fuel, and are consequently most thorough in their propaganda—maintaining staffs of technical advisers who keep in touch with both furnace manufacturers and furnace users.

SMALL UNIVERSAL NEW TYPE FURNACE.

In many engineering shops, garages, &c., there is an excellent field for the application of the small gas furnace which will operate at temperatures ranging up to 1400° C., and also provide a chamber suitable for accurate heat treatment at temperatures up to (say) 950° C., together with provision for the melting of babbitt and other soft metals. To advise the installation of a blast furnace, involving an electrical supply, including motor and blower—which auxiliary apparatus often costs more than the furnace—is to face the small man with an expense which frequently he will not meet. A furnace has, therefore, been developed which will comply with the whole of the requirements of the small engineering shop, from forging to tempering and metal-melting operations, in a compact, small, independent unit, dispensing with the use of auxiliary apparatus. This furnace will operate on natural draught, and will quickly attain the full working temperature of 1400° C. The main advantages of this furnace are:

1.—Compactness of construction.
2.—Low first cost.
3.—Rapid heating and attainment of working temperatures up to 1400° C.
4.—Elimination of all auxiliary apparatus by the utilization of a small natural-draught single burner, and live heat recuperator of the flash type.

A working temperature of 1200° C. is attained in the lower heating chamber within 25 minutes, and 900° C. in the upper heating chamber within 30 minutes. The gas consumption, starting from cold, is maintained at the rate of 250 c.ft. an hour for a period of 40 minutes, to allow for thorough saturation of the heating chambers, after which it is reduced to 180 c.ft. an hour, at which rate full working temperatures may be maintained.

RECUPERATION IN SMALL FURNACES.

An important point to be observed in designing recuperators for small furnaces for intermittent work is that this organ should operate, as nearly as may be practicable, in phase with the heating cycle of the furnace. The recuperator elements should be of light construction and high specific heat conductivity. These considerations often outweigh the questionable advantage of abnormally high thermal efficiencies, only attainable after long soaking periods.

I have examined many recuperative furnaces operating intermittently or on eight-hour shifts in which the recuperators require several times the normal working period of the furnace to reach full efficiency. Such furnaces are a misfit. Cheaper furnaces with smaller recuperators having less mass, and of a design proportioned to the operating requirements, will give higher all-round commercial efficiency.

NEW "1600 C." TYPE WELDING AND FORGING FURNACE.

The problem of efficiently and rapidly obtaining and maintaining high temperatures necessary for welding, forging, and melting heats in a comparatively small furnace has been successfully solved in the "1600 C." type furnace. The furnace is of the open aperture type, having a heating chamber 18 in. wide by 15 in. deep, in which temperatures as high as 1780° C. have been registered with low-pressure gas, and air supply pressure of 4 in. water gauge. The following is a test of this furnace:

Test Taken on "1600 C." Type Furnace by Mr. E. R. Taylor, of Birmingham Technical School. May 13, 1925.

Size of furnace, 18 in. wide by 15 in. deep.
Heating of 1-in. round steel bars to full forging temperature.
Temperature of furnace at start, 1580° C.
The cold bars were placed in the hot furnace, and withdrawn from time to time as the necessary temperature was attained. The continuous charging and discharging took place over a period of one hour
Output per hour, 140 bars thoroughly soaked at forging temperature. Total weight, 378 lbs.
Gas consumption per hour, 960 c.ft.
Temperature of furnace before the test, 1580° C.
Temperature of furnace five minutes after the test, 1580° C.
Output per sq. ft. of hearth area, 201 lbs.
Gas consumption per pound of metal heated, 2·54 c.ft.

The results obtained, from the point of view of fuel cost alone, ignoring the obvious advantages of convenience, saving in labour, &c., are comparable with the best results obtainable in furnaces of this size with coke, coal, or oil.

HEAVY TYPE RECUPERATIVE BILLET-HEATING FURNACES.

The author next dealt with a recuperative gas-fired billet-heating furnace having a heating chamber 4 ft. 3 in. long by 3 ft. wide by 18 in. high, and an average capacity of 9 cwt. of steel per hour heated to forging temperature. Possibly the best comment regarding this furnace is the following summary of a letter received from M. Domus, Managing Director of the Forges et Estampage de Malines, Belgium—a Company associated with, and manufacturing, the whole of the alloy steel forgings for the "Minerva" motors. M. Domus has had an extensive experience with all types of furnaces and fuels as applied to forging practice in Belgium, France, and Germany.

Forges et Estampage de Malines. 11.1.1926.

Cost of gas, 35 c. per cub. metre.
Cost of coke, 130 frs. per ton.
Calorific value, same as Britain.
With gas furnace heating alloy steel to 1150° C., cost of gas = 13 c. per kg. of steel heated.
With coke furnace under same conditions, cost of coke = 10 c. per kg. of steel heated.
While gas shows a fuel cost of 3 c. per kg. more than coke, it eliminates absolutely a loss occurring with coke furnace operation of 5 p.ct. of the total weight of steel heated, and thus effects a saving of 15 c. per kg. of steel heated, or a net saving of 12 c. per kg.

Even if operation costs show no saving, M. Domus would give preference to town gas as a fuel, as the steel produced is free from internal oxidation, and more reliable in quality.

TOWN GAS APPLIED TO LARGE SHIPYARD PLATE AND ANGLE FURNACES.

A furnace at present being installed in a ship repairing yard in the Sunderland area has a plate-heating section 21 ft. long by 7 ft. wide by 3 ft. high to crown, and angle bar extension 3 ft. wide by 2 ft. 1 in. high by 23 ft. long. The over-all length of the furnace is 44 ft., and it is designed to operate at 1000° C., at a gas consumption of 4200 c.ft. per hour. After a com-

plete and impartial analysis of the total costs of operation for intermittent service generally met with in repairing yards, it was found that town gas would show a saving of at least 10 p.ct. on the best results obtainable by oil. In arriving at these costs, depreciation, labour, repairs, first cost, and fuel cost were all taken into account.

In computing the total operating costs for any furnace installation, the cost of fuel consumed per hour, or per shift, is by no means the controlling factor. Town gas, even though showing double the hourly fuel cost for the maintenance of working temperatures in comparison with other fuels, can in many instances be applied with commercial success to large furnaces as against solid fuel firing, by reason of:

1.—Reduction in stand-by losses.
2.—Low maintenance and labour costs.
3.—Interest on smaller investment.

These three items, applied against an effective operating service of (say) 1000 hours a year, often have a cumulative importance from the cost point of view much greater than that of the single item of fuel.

The following is a table of the computations which determined the selection of the furnace for this yard:

Analysis of Total Operating Costs, Resulting in selection of Town Gas in preference to Coal or Oil Firing, based on intermittent operation.

1000 hours per annum.

—	Town Gas Furnace. Installation Cost £1000.	Oil Fired Furnace. Installation Cost £1400.	Coal Fired Furnace. Installation Cost £1500.
Total cost of fuel per annum	£500 Gas at 2s. per 1000 c.ft.	£315 Oil at 85s. per ton	£175 Coal at 20s. per ton
Interest on investment at 6 p.ct.	£60	£84	£90
Furnace repairs, average per annum	£15	£50	£60
Extra labour for fuel handling and control	*Nil*	£90	£200
Depreciation	£50 at 5 p.ct.	£140 at 10 p.ct.	£150 at 10 p.ct.
Total cost per year of 1000 hours	£625	£679	£675
Average cost of operating per nour	12s. 6d.	13s. 7d.	13s. 6d.

These figures further demonstrate a very important advantage which town gas furnaces possess over other types—*i.e.*, that the gas cost is the major cost, and that with its use the dead or non-productive charges are relatively low. Gas represents in this instance 80 p.ct. of the total cost of operation. The fuel cost for oil firing is 46 p.ct. of the total cost of operation, and the dead charges 54 p.ct. The fuel cost for coal is 26 p.ct., and the dead charges 74 p.ct. These figures expose the fallacy—unfortunately too prevalent—of selecting furnace plant on the basis of relative fuel cost alone.

With a gas furnace designed for selective heating, necessary in connection with the hardening of knife blades, files, tubes prior to bending or tagging, &c., in one of the leading Sheffield cutlery works, the cost of operation has been reduced to one-third of the former cost with the direct gas-fired blast furnace.

The introduction of a furnace designed for the continuous hardening and tempering of band saws has reduced the cost of band-saw production out of all proportion to the cost of town gas used, and, in addition, has brought the hardening and tempering operations under the exact control necessary for realization of the best physical characteristics of the steel used.

Oven and Muffle Furnaces.

A great deal has been written in regard to this form of furnace, which has been developed to a very high degree of efficiency. The temperature may be controlled to within 5° C.; and the atmosphere or furnace gases may be similarly controlled to give neutral, reducing, or oxidizing effects, as may be desired. Useful thermal efficiencies, under favourable conditions, as high as 45 p.ct. may be attained.

Town Gas as a Useful Auxiliary to Furnaces Fired by other Fuels.

It is a well-known fact that, in close annealing of bright steel in bulk, in pots, the original atmosphere of the pot, due to expansion, is greatly reduced in oxidizing strength, and that the blueing of steel occurs mainly during cooling, when the atmosphere of the pot contracts, drawing in fresh supplies of oxygen from the outer atmosphere. Very little, if any, oxidation occurs during the annealing. To overcome this blueing effect, the pot is removed from the coal, coke, or oil fired furnace, and immediately plunged into a cell containing town gas, which forms an inert atmosphere in relation to the steel under treatment. The pot, cooling in the cell, by contraction of its atmosphere draws gas instead of air through its seal, with the result that the process of annealing and cooling the steel is carried out without detriment to its surface; and the original brilliant silver finish conferred upon its surface by rolling or drawing operations is maintained.

By the introduction of gas for this purpose, the output of many plants using swarf packing for the protection of steel and to prevent its oxidation is increased 400 p.ct.—*i.e.*, four heats per day may be obtained from large furnaces, in place of one heat per day by the swarf method. This is a very important point.

At this stage, Mr. Fallon illustrated a 50 ft. producer gas fired ten-holed muffle patenting and annealing furnace for the continuous treatment of both carbon steel and mild steel wire. Three wires are drawn through each hole continuously; and the output of such a furnace is approximately 10 cwt. of wire per hour. The normal scaling of the wire in these muffle tubes is approximately 6 p.ct. of the weight of wire treated. It is a common thing to see small mountains of scale accumulated from this process at various wire works. The utilization of town gas for flooding these tubes, and preventing the admission of air, will reduce the scaling of the wire to 0·75 p.ct. On an output of 60 tons a week, this means a saving of 3·15 tons of metal at a gas cost of approximately £6 a week—*i.e.*, less than £2 per ton of wire saved.

Utility of Gas in Prevention of Mill Roll Breakages.

Town gas has been very usefully and effectively applied for maintaining the temperature of large and expensive sheet mill rolls during shut-down periods. Many of these rolls are 30 in. in diameter, and weigh from 5 to 6 tons each. Sudden chilling of the surface during shut-down periods often results in a fracture of the roll. Heating of the rolls during these periods by a series of small bunsen jets eliminates roll breakages from this cause.

Reversing Recuperative Furnace.

The main problems in design of the recuperator are as follows:

1. To construct the recuperator with walls as thin as possible, in order to minimize the heat drop between waste gas and air passage-ways.
2. To construct these walls as substantially as possible, in order to resist the high temperature effects obtainable by intensive recuperation.

In practice, the design of the recuperator is a compromise between these two opposing conditions. The new form of reversing recuperative furnace is of such design that the walls of the contra-flow recuperator may be of substantial construction; and, by alternating the air and waste gas flows, the heat gradient or drop through the walls is considerably reduced. The mass effect of these walls is used in the same way as the checker-work in the Siemens furnace.

This furnace has the further advantage that the temperature may be maintained on the continuous recuperative principle without the use of the reversing valve, which may be considered as an auxiliary for the purpose of quickly stepping-up temperatures to the point desired, after which these temperatures may be easily and efficiently held on the continuous recuperative principle.

Mr. Fallon is of opinion that this furnace will bring into commercial range of application for town gas many additional heating processes which cannot as yet be economically dealt with by this fuel.

Cost Relationship of Furnaces Operated by Various Fuels.

Considering town gas and electricity as being equal in their utility to furnace application, town gas at 2s. 6d. per 1000 c.ft. compared with electrical energy at 1d. per KW.-H. contains nearly five times as much heat per penny; and with the modern gas furnace useful thermal efficiencies are attained approaching those obtainable by the electric furnace, which has the serious disadvantage of lacking convection current effects so essential for rapid heating and high outputs per unit hearth area.

Other fuels, while showing a much greater heat value per penny of expenditure involved, as previously explained, necessitate additional expenditure for the purpose of gasification, handling, &c.

The author then showed a diagram of the fuel cost of furnace operation for the annealing of steel or other materials at 800° C. in outputs ranging up to 300,000 B.Th.U. per hour, or the equivalent of approximately 15 cwt. of steel per hour.

For infinitesimal heat demands, the most convenient source of heat energy is the most suitable; and for small demand, convenience outweighs considerations of fuel cost. As the capacities or outputs increase, electricity as a fuel quickly drops out of serious consideration. In the opinion of the author town gas at present begins to drop seriously out of favourable comparison with liquid or solid fuels at outputs exceeding 200,000 B.Th.U. per hour.

A reduction in cost of gas, or increase in furnace efficiency, will tend to bring the gas into closer relationship with solid fuel and oils, and thus extend the sphere of its application. It must be borne in mind that there should be imposed upon the coal and oil costs an additional margin for dead charges not incurred with gas. As previously pointed out, this margin occasionally exceeds the difference in fuel cost, even for large furnaces for intermittent use, and invariably exceeds the difference in fuel cost in outputs ranging up to 100,000 B.Th.U. per hour.

PRODUCER GAS FIRED FURNACE FOR ANNEALING STEEL SHEETS.

A furnace—the largest of its type in Europe—installed by the Incandescent Heat Company in a large sheet mill in Cheshire has a net capacity of 1250 tons of sheets per week of 132 hours, annealed at 950° C., or 2000 tons per week, gross, inclusive of annealing covers and dishes.

With this furnace the life of annealing covers and dishes has been increased over 100 p.ct. in comparison with direct coal firing. In most sheet and tinplate mills the depreciation cost of covers and dishes exceeds the total fuel cost.

The fuel consumption in this furnace is under 6·25 p.ct. (or 1¼ cwt. of coal per ton) of the net weight of sheets annealed, and approximately 3·9 p.ct. of the gross weight of metal passed through the furnace. The thermal efficiency in terms of gross weight of metal heated is 50 p.ct., and in terms of net weight of sheets annealed 31·15 p.ct.

This installation is fired by hot crude gas from a bituminous water-seal producer plant located at a distance of about 300 ft. from the charging end. The thermal efficiencies mentioned are the overall efficiencies and include all losses in producers, mains, and during stand-by periods, &c., and represent, therefore, the ratio of actual fuel charged at the producers against the net weight of sheets satisfactorily annealed.

In ordinary direct coal-fired batch heating furnaces the fuel consumption for the same class of work is 300 p.ct. greater, and the life of covers and dishes approximately 50 p.ct. less.

In conclusion, Mr. Fallon thanks Mr. Spinks and Mr. Hems for their assistance and helpful suggestions in connection with the paper.

Discussion.

The CHAIRMAN remarked that it was refreshing to hear of the numerous advantages attached to the use of town gas for furnace work. He was interested in the author's reference to the attainment of a hearth temperature of 1600° C. which would be suitable for testing refractories.

Mr. C. F. TOOBY, Senior Vice-President, said that Birmingham had devoted close attention to the industrial application of gas. They had their own industrial section; and he suggested that it would be of great advantage to the industry if every industrial town had a similar organization. He pointed out that at Coventry the industrial consumption constituted about 40 p.ct. of the total output. He moved a vote of thanks to Mr. Fallon for his paper.

Mr. H. R. HEMS (Birmingham), in seconding the resolution, observed that many gas undertakings appeared to be indifferent to the industrial load. This attitude of mind would, sooner than later, have to be altered. He was sure there was great need for a small furnace with preheated air supply such as the author had described—a furnace worked at ordinary pressure, without a blower motor. In many factories and works very crude forms of furnaces were in use; and when one considered the amount of money often spent on tools, as well as the value of the material being worked, he felt that such procedure was short-sighted. Efficient furnaces were, in the end, far more economical. Many ordinary natural draught oven furnaces were working satisfactorily in Birmingham.

Mr. FALLON said that, with muffle furnaces, any temperature condition could be maintained with gas at a moderate pressure. He was convinced there was no advantage in the preheating of town gas to high temperatures.

Afterwards Mr. Fallon showed samples of bright annealed sheet steel and Ruskin pottery ware fired in a gas furnace at West Smethwick.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

[In a paper at this meeting, Mr. G. Gardiner, of Wandsworth, puts forward the design of what he considers to be an ideal coal store. He shows that much of the space in existing stores is wasted, and indicates how this can be avoided. One of the suggestions contained in his paper is to carbonize different coals in different retorts—those coals requiring less heat being fed into the retorts which are at a lower temperature.]

A Meeting of the Association was held at the Westminster Technical Institute on Friday, Jan. 29, under the presidency of Mr. W. L. WESTBROOK. A paper on the design of coal stores, which gave rise to an interesting discussion, was read by Mr. G. Gardiner, of Wandsworth, who illustrated his remarks by a series of exceedingly clear diagrams.

DESIGN OF STORES FOR BITUMINOUS COALS.

By G. GARDINER, of Wandsworth.

A paper submitted by a "Junior" cannot always give an account of work carried out by himself. However, it can contain a record of things keenly observed, show where improvements can be effected, and outline projects for the substitution of new plant or buildings in place of existing ones. These projects are oftentimes chimerical, for not all "Juniors" can eventually attain positions from which they can put into being proposals of this kind.

Such a paper is now before you; and it contains a record of things observed over a period of twenty years relating to the storing of bituminous coals. It then goes on to consider the proper method of storing coals, and eventually finishes with a description of a design for the ideal coal store.

At the outset, I venture to suggest that the proper storing of coals in a gas-works is of primary importance, and that no carbonizing system should be considered without simultaneous consideration of the storing of the coal.

I have found the subject one of most profound interest (far more engrossing than the most complex cross-word puzzle); and I hope that my subject will prove equally interesting to members.

Necessity for Storing Coals.—A thing is said to be necessary for a certain end in two ways: First, when the end cannot be without it; as food is necessary for the preservation of human life. Secondly, when the end is attained better and more conveniently; as a horse or a motor car is desirable for a journey.

If ideal conditions prevailed, it would not be necessary to store coals, according to the first conception of the meaning of the word necessary; for then coals could be received at a varying rate according to the varying quantities required. However, owing to the variable demand for gas, the difficulties of transport, &c., it is essential to keep a stock of coal in hand. Taking the second meaning of the word necessary, it is easier, or rather it would be easier, to manufacture gas of uniform quality from coal of different kinds, and of varying qualities, if the proper type of store were built.

Advantages.

(*a*) Immunity from effects of industrial strikes of short duration.
(*b*) Immunity from hold-up of deliveries owing to bad weather.
(*c*) Acceptance of deliveries in summer at cheaper price (in some instances).
(*d*) Immunity from congestion on rail and at pit head.

Disadvantages.

(*a*) Spontaneous combustion.
(*b*) Reduction in gas-making value.
(*c*) Increased cost of handling.
(*d*) Poor quality of the coke produced.

Quantity that Should be Stored.—An allowance of 2000 tons of coal per 1,000,000 c.ft. of gas per diem is a good figure on which to work. The stock should equal 28 days' supply. However, so much depends upon the size of the undertaking and on the distance it is situate from the source from which it obtains its supplies, that each problem must be fully considered by itself. Gas has become so indispensable that some of the larger companies hold a stock equivalent to at least two months' gas make, in order to be able to maintain the supply of gas, no matter what may be the cause of the cessation of supplies.

Proportion of Coal that can be Removed from a Store by Mechanical Means to that for which Manual Labour must be Employed.—In the early days of gas manufacture the coal stores built were of brick and of a substantial character. However, at that time, conveyors and elevators as we know them to-day were not in use. Indeed, before the introduction of charging machinery, the design was uninfluenced by any consideration of any mechanical means of filling or of emptying the store. Generally, the building (a covered one) was built parallel to and adjacent to the retort house. Coal was withdrawn from the store through openings under the front partition. Usually the coal was deposited in the store by small trucks running on an overhead gantry of some kind. However, the introduction of power-driven stoking machinery necessitated elevating a quantity of coal into the overhead hopper at the top of the charging machine. The elevator was usually fixed to the charging machine, and therefore coal could be elevated into the hopper on the charging machine from any point throughout the whole length of the retort house. It was soon found that the time spent in elevating coal into the hopper on the charging machine held up the work of charging the retorts to such a degree that this method was abandoned. Fixed overhead hoppers were then placed in the roof of the retort house, and an elevator, fixed in position with its boot below the coal store floor, was installed. In many retort houses to-day this type of coal handling plant is to be found. It is efficient, but the author considers that this method of placing coal in overhead hoppers is far from being ideal. In the first place, the range of available coal is limited to that contained in an inverted truncated cone, the angle of inclination of the conical surface being 40° to the horizontal. Nowadays coal is often brought into the coal store by an overhead system of trucks, or better still by a conveyor. A belt conveyor is a useful type of conveying plant to convey coal into the coal store; but when once the coal is deposited in the store, manual labour must be employed to bring it to the elevator. A much better method of bringing coal into the coal store, and which lends itself to removing a substantial proportion of coal, is by means of a gravity bucket conveyor, the lower path of which passes through

a tunnel at the bottom of the coal store. By this method coal can be re-elevated and deposited at the boot of the elevator.

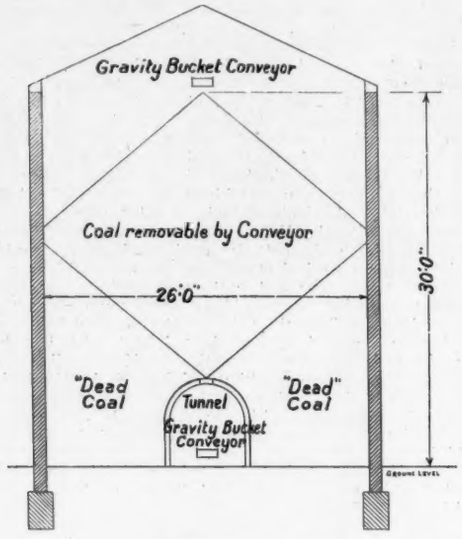

Diagram No. 1.

Diagram No. 1 shows a cross-section of a good old-fashioned type of coal store. It was substantially built. Indeed, it was a credit to the engineer who designed and built it as a coal store. Its height from floor level to roof principal shoe level is 30 ft., and its internal width 26 ft. To modernize this store as far as possible, a gravity bucket conveyor was placed in it (as shown on the diagram), and a steel tunnel was erected on the existing concrete floor, as conditions of surface water rendered it impossible to place the tunnel wholly underground. It will be seen that there are two empty triangular areas above the surface of the coal to the roof principal shoe level. It will also be noticed that only a proportion of the coal can be removed from this store without having recourse to hand trimming. A few calculations have been made relating to this section which may prove interesting; and the author hopes they may serve to emphasize the necessity for giving more attention to the design of the coal store, when it is known beforehand what kind of conveying plant will be used:

Whole area	Width	26 ft.
	Height to shoe level	30 ft.
	Less for the tunnel	44 sq. ft.
	Area	736 sq. ft.
Area of coal	Width	26 ft.
	Height	24 ft. 6 in.
	Area	593 sq. ft.
Area of coal removable by conveyor		312 sq. ft.

It will be observed that, of the total cross-sectional area of 736 sq.ft., only 593 sq.ft. is occupied by coal, which equals 81 p.ct. Of a total area of coal of 593 sq.ft., 312 sq.ft., which equals 53 p.ct., is removable by the conveyor, leaving 47 p.ct. to be hand trimmed. Quite apart from the cost of manual labour required for this purpose, no words can adequately convey to members the undesirability of leaving this quantity of dead coal at the bottom of the coal stores. It is the most fruitful cause of the heating-up of the whole mass of coal; and before it can be got at, obviously the upper coal must be removed first. The coal becomes consolidated to such a degree that a pick must be employed to loosen it before the shovel can be used. Furthermore, if the store has no cross-walls, it frequently means that a considerable portion of the store must be emptied before any new coal can be deposited. (The average thickness of the coal in this store is 23 ft.)

Diagram No. 2 shows the same store as that in Diagram No. 1. The only difference is that the tunnel is placed entirely below floor level:

Whole Area	Width	26 ft.
	Height	30 ft.
	Area	780 sq. ft.
Area of coal		637 sq. ft.
Area of coal removable by conveyor		494 sq. ft.

Of the total area of 780 sq.ft., only 637 sq.ft. is occupied by coal, or 81 p.ct. Of a total coal area of 637 sq.ft., 494 sq.ft. is removable by the conveyor, or 78 p.ct., leaving 22 p.ct. to be removed by manual labour. The remarks relating to the dead coal also apply in this case. (Average thickness is 24 ft. 6 in.).

Diagram No. 3 shows a store equal in height to those shown in Diagrams Nos. 1 and 2, but its width is 35 ft. 9 in. The width has been determined by the intersection of two lines inclined at 40° to the horizontal (the natural angle of repose of coal to the horizontal). The upper line represents the natural

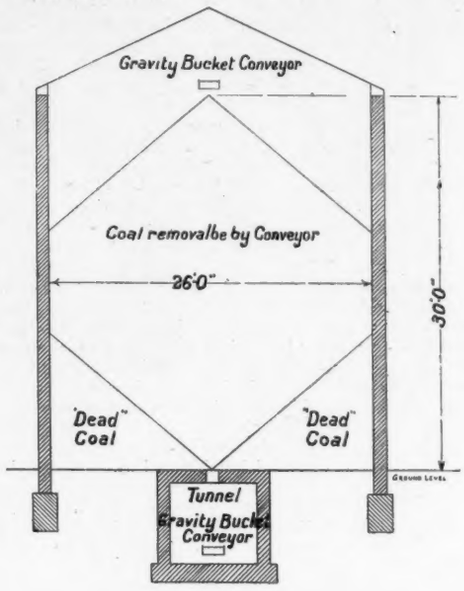

Diagram No. 2.

angle of repose of coal taken up, and the lower one the limiting line of coal which will run to the conveyor without trimming.

Whole area	Width	35 ft. 9 in.
	Height	30 ft.
	Area	1073 sq. ft.
Area of coal		804 sq. ft. (75 p.ct. of whole)

Area of coal removable by conveyor, 67 p.ct. of the coal area, leaving 33 p.ct. to be removed by hand.
(Average thickness of coal, 22 ft. 6 in.)

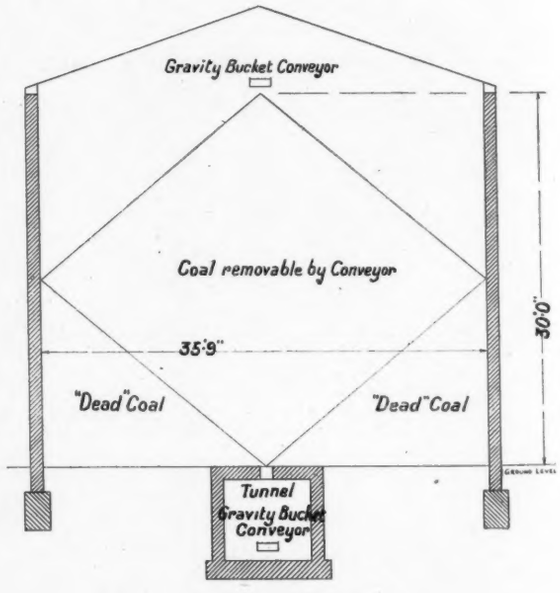

Diagram No. 3.

Naturally the question of replacing the dead coal as shown in Diagram No. 4, by filling of either hard core or earth, would suggest itself. However, this would mean filling in 33 p.ct. of the coal area. The maximum height of the filling would be 15 ft. It will be observed that the side walls would now be employed to support the filling only, and would perform no direct duty of supporting the coal. If, therefore, the subject of replacing the dead coal space be considered (and most engineers are naturally very reluctant to give up one inch of storage space), it appears to the author that some limit of width should be set for the store. What that limit should be is not always easy to decide. It will be seen that the land occupied by the outer edges of the heap would not be economically employed, and therefore, for this additional reason, the most economical width of store should be decided upon. As far as the author is able to ascertain, the most suitable width would appear to be one determined by a vertical line, so placed as to make each of the triangles of dead filling at the bottom of the store equal in area to the triangles of coal which are cut

off at the sides. First, we will notice that the roof has been placed parallel with the upper surfaces of the coal, so that there are no waste spaces above the surface of the coal.

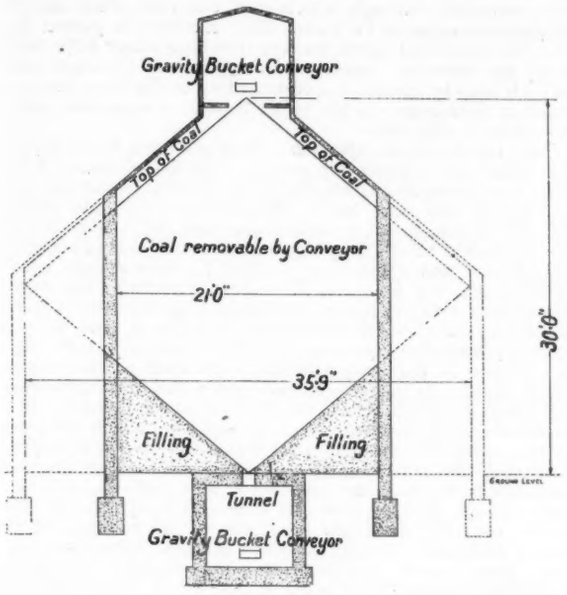

Diagram No. 4.

Let us examine a few figures relating to the stores so designed. Whole area, 21 ft. by 21 ft. $5\frac{1}{2}$ in. = 538 sq. ft. If the two triangles at the bottom are filled up with some kind of filling material, then all the coal in the store can be removed by the conveyor. Coal area, 446 sq. ft. = 81 p.ct. of the whole area of the coal store, leaving 19 p.ct. of filling in place of dead coal. A few more points of interest in connection with this are: Height of wall above top of filling, which is doing direct duty of supporting the lateral thrust of the coal, is 12 ft. 6 in. The maximum depth of filling is 8 ft. 9 in., which seems a reasonable figure. This is equivalent to a depth of 4 ft. $4\frac{1}{2}$ in. for the whole area. The land occupied is only 59 p.ct. of that occupied by the coal store in Diagram No. 3, while the area of coal is $8\frac{1}{3}$ p.ct. of that in the latter. (Average thickness of coal, 21 ft. 3 in.)

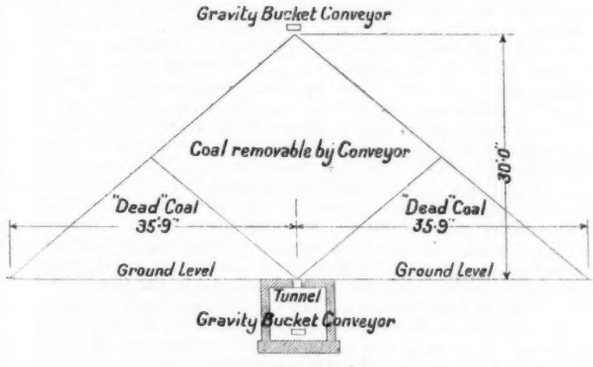

Diagram No. 5.

Diagram No. 5 shows the maximum amount of coal which can be deposited by a conveyor of a given height. In this example the conveyor is 30 ft. high. The width of the base is, therefore, 2 cot 40° × H = 2 × 1·1918 × 30 = 71 ft. 6 in. The area of coal which can be removed by the conveyor passing through a tunnel wholly underground is 50 p.ct., leaving 50 p.ct. which would require manual labour to remove it. Coal area...30 ft. by $\frac{71 \text{ ft. } 6 \text{ in.}}{2}$ = 1073 sq. ft. (Average thickness of coal in this heap 15 ft.). This is the maximum quantity of coal which can be deposited by a gravity bucket conveyor of given height, and it seems rather a pity that only 50 p.ct. can be removed without hand trimming.

Advantages of being able to Use Coals in the Same Order in which they are Received—to Select Coals from Stock for Blending.—The coal carbonized in a works is usually that which is being delivered at that particular time, and the reserve stock is made up from excess deliveries; and only when deliveries fall below the quantity required for carbonizing is the reserve stock drawn upon. A better arrangement would be if all coal could be carbonized in the same order as it is received; thus the reserve stock of coal would be constantly changing. Trouble from spontaneous combustion, &c., would thereby be reduced to a minimum. Every engineer who is responsible for the production of gas knows how difficult it is to maintain a constant supply of uniform quality, when the coals available are only those which are being delivered at that particular time. Coals are not only of different kinds, but the quality of one kind of coal varies considerably. How often does it happen that the engineer receives coal of an inferior quality, but has to carbonize it there and then by itself? He knows quite well that in the store he has some good coal; but alas, he is unable to get at it, because it is either intermixed with other coal or it is at the bottom of the coal store. In any case, the point is that he is unable to get access to it at that particular time. Facilities for gaining access to each kind of coal in stock would mean that the engineer would be able to mix a richer coal with a poorer coal, or a feebly coking coal with a strongly coking coal, &c. I have not yet mentioned the word blending; but in a properly designed store, the facilities referred to would admit of blending. Another advantage of selecting coals from stock seems to be that a coal which requires the longer period for carbonizing would be placed in the retorts which are of higher temperature; while a coal which requires a shorter period for carbonizing could be placed in the retorts in which the temperature is lower.

Ideal Position of Stores.—Other things being equal, the nearer the coal can be deposited to the point from which it will be carbonized, the lower the cost of coal handling. The majority of coal stores are built parallel to the retort house. In my opinion, a change should be made, and coal stores should be built at right angles to the length of the retort house. My reason for suggesting this is not only that a gravity bucket conveyor can be used to fill the store and withdraw coal from the bottom of the store, but the same conveyor can be used for filling the overhead hoppers of the retort house direct, without any additional elevating plant. The whole of the coal in the store would be, as it were, in the arm of the conveyor, and it could all be taken to the overhead hoppers by the conveyor, without hand labour. The force of this opinion will be better understood when the question of the design for "The Ideal Coal Store" is considered.

Influence of Methods of Unloading upon Design of Stores.—I propose to make only a passing reference to this point, because naturally it would depend whether coals are unloaded at ground level or above ground level. In the latter case, it is often convenient to run trucks on a gantry overhead and to tip direct into the coal store. However, I consider that facilities for withdrawing the whole of the coal from the bottom of the stores should always be provided, whatever the method of filling the store.

Advisability of Breaking Coal before Storing.—Lump coal should be reduced in size to cubes no larger than 1 in. side. Arrangements should always be provided for by-passing the slack coal when the lumps are passed through the breaker. It is important that no large lumps should remain where the gravity bucket conveyor is employed for removing coal from the bottom of the store; large lumps will bridge over the openings and block them. When these are poked aside, the coal will rush through the openings and overfill the conveyor buckets if great care is not exercised. The conveyor buckets will carry more coal if there are no large lumps.

Land Values—Tonnage per Unit Area.—Where land is scarce and dear, as in the cities, naturally the tendency will be to pile coal up to as great a height as possible. However, it is well known that there is a limit to which the height can be taken, as beyond a certain figure the danger of spontaneous combustion setting-in is increased. Furthermore, crushing of the larger pieces at the bottom will take place if the height is too great. In a design of a store where coal is being continuously withdrawn from the bottom, 40 ft. should be the maximum height. In a works situate in the country, where land is less costly, it will be more economical to reduce slightly the height of the store. Reference has already been made to the average depth of coal which can be kept in different types of stores, as shown on the various diagrams.

No. 1—	Average depth of coal.	23 ft.
No. 2—	" " "	24 ft. 6 in.
No. 3—	" " "	22 ft. 6 in.
No. 4—	" " "	21 ft. 3 in.
No. 5—	" " "	15 ft.

Gas undertakings generally begrudge capital for coal stores. This can be readily understood; for, after all, where coal is stored in the old-fashioned type of store, it often gives more trouble than if it were dumped in the open. If it becomes heated, as has already been emphasized in paragraphs relating to Diagrams Nos. 1 and 2, there is considerable difficulty in getting to the lower coal, and consequent expense in removing it. However, if a coal store can be built from which these objectionable features can be eliminated, then the saving effected in labour, &c., should be credited to the capital employed on building the store. To attempt to give actual figures would be futile, because the conditions prevailing in different gasworks are so varied that comparisons cannot properly be made. If, then, it can be shown that a properly designed coal store

can be erected for a moderate expenditure of capital, in which—

(1) Coal can be used in the same order in which it is received.
(2) Fresh deliveries of coal can be placed in the store, and coal withdrawn from stock as in No. 1.
(3) Coal can be selected from stock as desired so that coals of two kinds can be placed in retorts of different temperatures at will.
(4) Coal can be withdrawn from stock and mixed simultaneously.

then, in the writer's opinion, the necessary capital should be employed. It will be urged that the overhead capital charge is one which must always be borne. This is all too true; but when a proper analysis is made of all the saving that can be effected in regard to labour, preservation of coals from deterioration, and difficulties experienced in the retort house on account of varying qualities of coals, &c., I would ask at least that the matter should be seriously considered. The consequence would probably be that correctly designed coal stores, in the future, would always accompany retort houses where charging machinery was employed.

Materials of Construction.—(*a*) Brickwork. (*b*) Steel framework and plates. (*c*) Steel framework and concrete filling. (*d*) Reinforced concrete.

Under this heading could be written not only one paper, but papers dealing with each kind of material. So much depends upon where the store is to be built. (*a*) The old-fashioned store, built in brick, as such, cannot be beaten; but what of its cost to-day? Yet, where the walls have to take-up side thrusts, either tie rods or horizontal R.S. joists as ties have to be provided. The weight of the coal above often bends such rods and girders, and causes them to be inefficient. (*b*) For transhipment abroad, steel framework and plates prepared for assembling would be most suitable. Coal acts as a lubricant on steel and iron, and the outside surfaces only would require painting from time to time. (*c*) This kind of construction is not to be recommended unless reinforced concrete is employed as the filling, otherwise the concrete required becomes very heavy. (*d*) In the author's opinion, reinforced concrete is the material to employ, *par excellence*. The first cost is sometimes looked upon as heavy; but having regard to the maintenance costs being practically negligible, it is reasonable to suggest that this material will eventually replace all other materials for buildings of this character. Reinforced concrete in the design of a coal store lends itself to the various thrusts which have to be dealt with.

Design for the "Ideal Coal Store."—We come now to consideration of the design for the "Ideal Coal Store." Diagram No. 6 shows a cross-section, No. 7 a plan, No. 8 a longitudinal section, of such a design. The coal store is designed to serve a horizontal retort house. The carbonizing unit taken is a bench of seven beds of ten arranged in five tiers of two. In the author's opinion, a bench of six beds of ten is somewhat wasteful of floor space in a retort house; and since the expansion over seven beds can easily be allowed for, it seems that this is a better unit to take. On the other hand, where beds are made up of sixes or eights, arranged in tiers of three, nine such beds in a bench form a useful unit. Now, to proceed with our bench of seven beds. With a 17-cwt. charge and a twelve hours' carbonizing period, 119 tons per diem are needed, and 3332 tons per 28 days' stock. It will be readily admitted that the fewer the pieces of coaling plant employed to bring coal from the point of delivery to the overhead hoppers, the better the scheme and the cheaper the operation. The drawings show the coal store built with its length at right angles to the retort house, instead of parallel to the retort house, as in the majority of existing stores. This permits of a gravity bucket conveyor being employed to receive, convey, and elevate coals direct into overhead storage hoppers without an extra elevator being employed. The store is divided into a number of sections, ten in this case. The bottom of the coal store is formed of two sloping floors, inclined at an angle of 40° to the horizontal. A tunnel is built in the structure for the whole length of the store. The roof of the tunnel is peculiar, in so far as it is formed by a single sloping surface inclined at 40° to the horizontal, but the direction of the sloping surface is reversed halfway through each section of the store. This permits of coal being withdrawn from the store by means of vertical slides, which can be operated from the upper platform in the tunnel. A travelling rotary filler is placed in the lower part of the tunnel. The gravity bucket conveyor is equipped with a receiving hopper, coal breaker, jigging screen, and rotary fixed filler. Both the rotary fixed filler and the travelling filler are unique, so far as the author knows, inasmuch as they have been designed to fill alternate buckets of the conveyor. The travelling filler is equipped with power. Engineers, in order to produce a sloping surface so that the coal can run into the conveyor, leaving no dead coal remaining to be trimmed, are most reluctant to allow even one ounce of their coal storage space to be filled in. In the design shown, it will be seen that provision has been made for filling in the space under the sloping floors with coal. When the store proper is full, the coal runs over the upper edge of the sloping floors, and forms a heap, which is triangular in cross-section. Half of each heap is roofed in by the sloping floor, and the other by a removable roof. The heaps which are stored in this way will require manual labour to remove them, or a crane can be employed to remove a portion. Access can be obtained to this coal from the main tunnel by means of side entrances, through which men can take wheel barrows or portable trucks to fill them. They can then be pushed back into the tunnel and tipped into the travelling rotary filler, which feeds the conveyor. Access can be gained to the outer skirts of each heap by means of a crane. Two tracks have been provided at right angles to the retort house. A removable roof is provided on each side.

Now for the *modus operandi*. To begin with, let us suppose the stores and hoppers are empty. The first delivery of new coal is received and conveyed by the gravity bucket conveyor and tipped into (say) No. 1 compartment; the next delivery into No. 2 compartment; and so on until the whole ten compartments are filled. If, then, any excess of coal is being delivered over and above that required for carbonizing, it will be allowed to run over into the reserve store under the sloping floors, thus forming heaps of triangular cross-section. It will be observed that, even if ten different kinds of coal were received, provided the quantity of each did not exceed the capacity of one of the compartments, each kind would be separately stored. It has already been noted that the rotary fillers have been so designed as to fill alternate buckets, and it will be assumed that the store was filled by employing alternate buckets of the conveyor. Now to start filling the overhead hoppers with coal, the travelling filler is placed in front of the compartment from which the coals are to be withdrawn, and alternate buckets are filled with coal from this compartment. The coal is conveyed along the lower run of the conveyor at the tunnel floor level, elevated vertically in front of the wall of the retort house on the charging side, then conveyed horizontally under, then vertically in front of, and finally tipped into, the overhead hoppers. The empty buckets then pass along the upper run of the conveyor, and descend vertically at the end of the coal store, under the receiving hopper, &c., and finally back along the tunnel floor to be again refilled at the same point. It will be seen that this leaves an equal number of buckets free, into which deliveries of coal can be taken, and simultaneously conveyed and tipped into one of the compartments of the coal store. When deliveries are being made and deposited into the store, coal from stock can thus be simultaneously conveyed and elevated into the overhead hoppers ready for carbonizing. In the ordinary type of gravity bucket conveyor, a cam arrangement is attached to each end of the bucket, and a double tripping device is employed. However, in the type of conveyor which is employed in this scheme, each bucket has a cam on one end only. One series of buckets, therefore, has a cam on the left-hand side, and in the other series a cam is fixed on the right-hand side. A single tripping apparatus is suitably fixed at the overhead hoppers; and there are two trippers to each compartment. Facilities for mixing coals from stock are therefore provided, inasmuch as one series of buckets can be employed to withdraw one kind of coal from one compartment, and the other series for a different kind of coal from another compartment. Alternate buckets, therefore, can convey two kinds of coal and tip them into the overhead hoppers, thus mixing them. Furthermore, if there are two kinds of coal, one of which requires a longer carbonizing period than the other, they can be placed in different sections of the overhead hoppers. The retorts in the fourth and fifth tiers in beds of ten are generally of higher temperature than those in the other three tiers. Therefore, the coal which requires the longer carbonizing period can be placed in the fourth and fifth tiers, while that which requires the shorter carbonizing period can be placed in the lower retorts. The coal can be withdrawn from the compartments in the same order in which deliveries are made, except in cases where blending is carried on. Ample time, therefore, is allowed for the coal to be tested. Of the twenty-eight days' stock of 3332 tons, approximately 70 p.ct.—2332 tons—representing twenty days' stock, is contained in the compartments of the coal store proper, while the remaining 1000 tons reposes under the sloping floors of the coal store. As the maximum height of this heap is not greater than 12 ft., and as it is protected from the weather, the chance of spontaneous combustion setting-in is fairly remote. Should it do so, access can easily be gained to the coal affected, and it can be dealt with promptly. No coal, other than the 1000 tons, would ever remain in the store for longer than a period of 20 days (provided the retorts are not shut down); for after it had been in stock for 20 days its turn would come for being carbonized.

Now for a further consideration of the design. In the opinion of the author, the ordinary gravity bucket conveyor holds the first place for handling coal; for it performs the dual operation of conveying horizontally and vertically, and lends itself to being filled and discharged at almost any point along the chain run. Indeed, the gravity bucket conveyor is absolutely necessary for the design put forward for the "Ideal Coal Store." From an examination of the drawings, the cross-section in particular, it will be seen that without the gravity bucket conveyor the store would be almost useless, and certainly far from being an ideal coal store. It will be observed that the gravity bucket conveyor travels along the tunnel floor towards the retort house. The direction of travel is

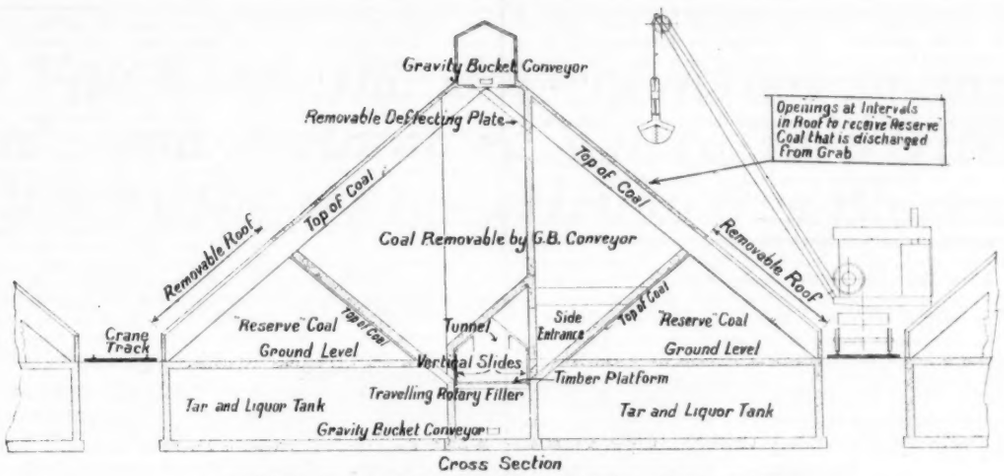

DIAGRAM No. 6.—CROSS SECTION OF IDEAL COAL STORE.

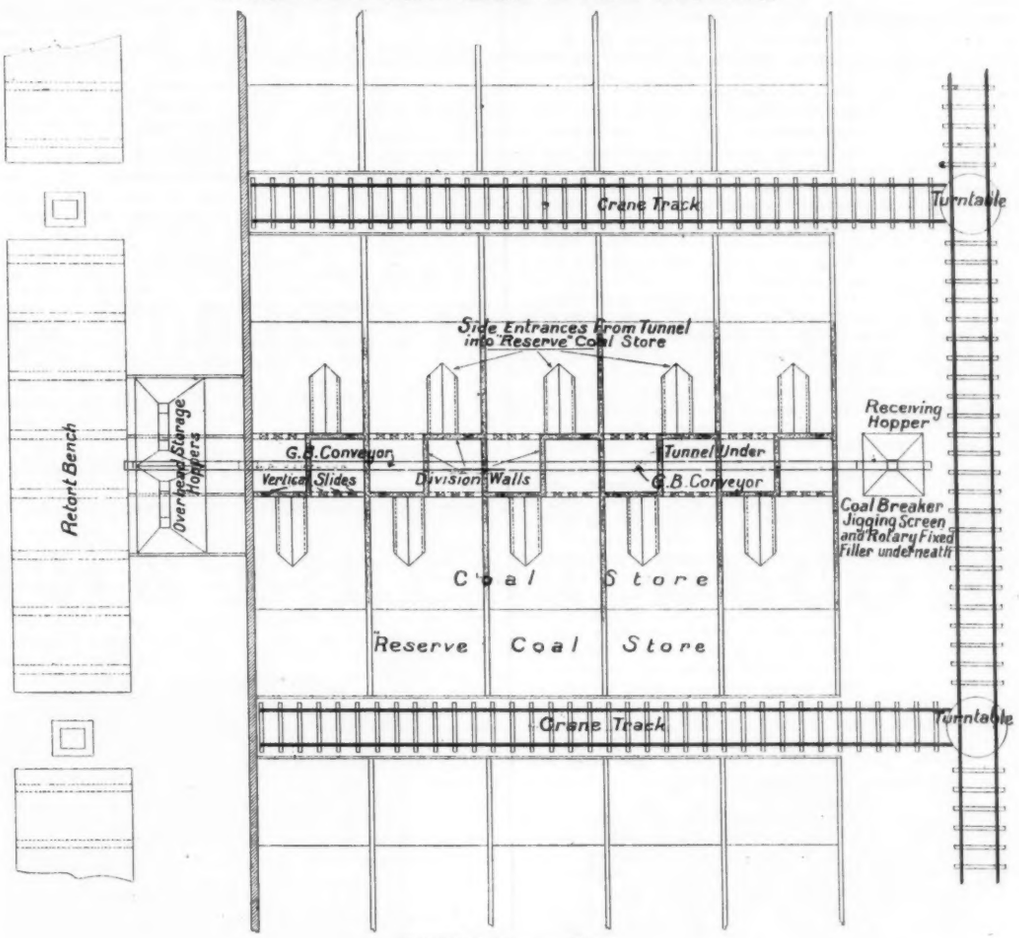

DIAGRAM No. 7.—PLAN.

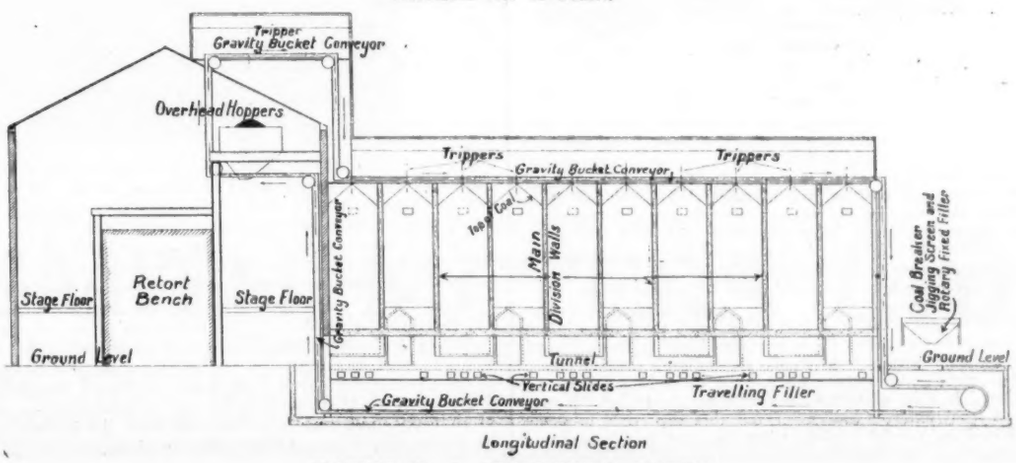

DIAGRAM No. 8.—LONGITUDINAL SECTION.

usually opposite to this; but this direction has been selected because, as those familiar with conveyors understand, it is always desirable to have a safety tripping gear after the tripper which is employed to tip the buckets at any point. Designs have been made for a steel structure, and a design has been prepared showing how reinforced concrete can be admirably employed for a structure such as this.

As will be seen from the cross-section and the longitudinal section, it will be necessary to excavate some distance down for a structure such as this, and in any case for the centre tunnel. As a tar and liquor storage tank is always required for a carbonizing unit, provision for an underground storage tank under the coal stores has been made. This does not necessarily form any part of the design for the "Ideal Coal Store."

The author considers that a structure thus designed will satisfy all the conditions required for an ideal coal store. He wishes to acknowledge the considerable assistance he has received in the preparation of this paper from the Chief Engineer, Mr. C. M. Croft, M.I.M.E., and the Assistant Engineer, Mr. E. Rees, of the Company which he serves, and for their kindness in facilitating the work of preparation of drawings.

Discussion.

The Chairman remarked that Mr. Gardiner's paper was full of interest. The author had been to an enormous amount of trouble in preparing the diagrams; and there could be no doubt that he was an enthusiast. The subject of coal storage was a most important one; and the paper should give rise to an excellent discussion by those on the manufacturing side of the industry.

Mr. W. Grogono (Gas Light and Coke Company) said they owed a debt of gratitude to Mr. Gardiner for all the trouble he had taken in presenting the paper. He was not altogether in agreement with the author in regard to the storing of coal under cover, particularly when the retort houses had a 24 hours' overhead store. Provided all handling was done mechanically—either by reclaiming bridges, as used in America, or by reclaiming cranes and rubber belts, which was common practice in England—coal could well be stored outside. When the author referred to the gravity bucket, did he mean a lipped bucket? The latter was likely to cause difficulty in the conveyor system outlined. Of course, the question of cost had to be considered; and the storing of (say) 20,000 tons of coal under cover meant an enormous expenditure. With regard to spontaneous combustion, if the coal was piled to a height not exceeding 17 ft., and the heap was ventilated with 6-in. cast-iron pipes drilled with 1-in. holes, there was not really much fear of overheating. At any rate, such had been his experience over a good many years. Referring to Diagram 4, could not the spaces indicated by the dotted lines be utilized by having a cantilever system? He knew of a plant designed in this way which dealt with 2000 tons of coal at a time. The coal was taken from ship to hopper by a rubber belt; and from the hopper, rubber belts carried the coal to the retort houses at will. Ships could be unloaded at night, and the coal handling plant could be run during the day. He wondered whether Mr. Gardiner had experienced any breakdowns of gravity-bucket conveyors in tunnels. In 1907 he had charge of a plant which embodied a gravity-bucket conveyor running in a tunnel; and he would not like to say how many nights he had spent in that tunnel, remedying faults in the conveyor. Doubtless vast improvements had been made since then; but he certainly had no desire to see another gravity-bucket conveyor in a tunnel. The author had given them a list of the advantages of storing coal under cover, and had mentioned, among other things, that coal could be selected from stock as desired. This facility of being able to select coals for carbonizing was most important; but, if care was taken to plot the heap in squares, the same advantage could be claimed for outdoor storing. Mr. Grogono concluded his remarks by thanking Mr. Gardiner for his paper, which, he said, must have been a work of months.

Mr. D. Cleave Cross (Lea Bridge) complimented the author on the ingenious ideas embodied in his paper, which dealt with a subject which had not been discussed by their Association for some years. Mr. Gardiner had stated that one of the disadvantages of storing coal in the open was that the quality of the coke produced from the coal so stored was inferior. The extent of the deterioration depended, of course, on the length of time the coal was stored, but in any case he did not think it was great. He favoured the idea of storing under cover as much as possible, but it was not practical to store (say) six weeks' stock under roof. The whole question of storage depended on the mechanical handling devices available. Storing under cover certainly had the advantage that conveying plant was completely protected from the weather. A month's stock was ideal, but at present no engineer could afford to be without at least a six weeks' supply. Last summer most gas companies could say they had enough coal to meet a six or even an eight weeks' gas demand; but, owing to bad deliveries, and the severe weather, experienced lately, few undertakings—at any rate, in the South of England—could claim more than a three weeks' supply. He did not agree with the filling suggested by the author, and shown in Diagram 3. Rather than waste this space, he would fill it with coal, and man-handle the latter. Mr. Gardiner had arranged for a depth of coal of 21 ft. 3 in. Personally he thought this was too great, due to fire risk. Mr. Grogono had mentioned 17 ft. as a maximum. Personally, he put the figure at 20 ft. Few engineers would consider it a good plan to put their coal into stock, and then take it out again. It was better to dump it, as received, into the hoppers, and use the storage as a surplus. After all, the author's method meant handling the coal twice—a feature which could often be overcome by careful buying. It was, of course, desirable to blend coals, if they were received from different collieries; but this also could in many cases be effected by careful buying, when the coal was brought to the works by rail, without the necessity of putting the coal into stock. With seaborne coal, it was much more difficult. Mr. Gardiner's suggestion of placing two grades of coal into the hoppers above the setting was idealistic, but hardly practical. With regard to the reinforced concrete store, he did not care for the sloping roof, which allowed of an emergency store, but necessitated the employment of a crane. Also, with the present low price of steel, he thought it would be cheaper to erect a steel-lined building with a filling of breeze blocks or of bricks. Another disadvantage of the system advocated by the author was the enormous length of the conveyor.

Mr. Leonard Lacey (Gas Light and Coke Company) agreed with Mr. Cleave Cross that there was not much evidence to show that the coke produced from coal which had been stored for a reasonable period was markedly inferior. As to the reduction in gas-making value of the coals so stored, could the author give them an idea of the amount of this reduction? He was not quite clear how the buckets of the conveyor were filled from the store. It seemed to him that insufficient coal was stored above the retort house, and that it was not a good plan to have a long conveyor feeding the hoppers above the retort bench.

Mr. Gardiner, replying to the discussion, said that the lip bucket was unsuitable for his system, and was not employed. As for the gravity-bucket conveyor, he could write a litany of praises for it, and he could write a contrary litany in respect of coal elevators. There was absence of friction in modern gravity-bucket conveyors, and he had never known of a serious breakdown. If the speed was increased beyond (say) 50 ft. per minute, trouble might arise; but he had seen conveyors handling 100 tons per hour without difficulty, and he knew of no better system. With regard to ground space, this was, of course, taken up whether the coal was stored under cover or in the open, and in this respect the former had the advantage. Mr. Grogono, referring to Diagram 4, had suggested having a cantilever hopper, but he (the speaker) did not see that much use could be made of the space covered in. The method of storing coals in plotted squares was most interesting; and there was no doubt that coals should be tested before carbonizing. As to the quality of coke made from stored coal, this deteriorated in proportion to the length of time the coal was stored. It was, however, difficult to arrive at exact conclusions, as a great deal depended on the type of coke-handling plant. A store of 28 days' capacity might seem small for the larger undertakings, but he thought it was sufficient for works of an average size. If coal was piled over a certain height, spontaneous combustion would set in; but by his system the coal could be turned over without difficulty if there was likelihood of danger. Mr. Cross considered the idea of filling the different retorts with different coals as being impracticable. So it was at present; but there was no doubt that some varieties of coal required less heat for carbonizing than did others. The carbonizing period could not be altered to cope with this variation, so the obvious remedy was to carbonize in the retorts at the lower temperature those coals which needed less heat. Perhaps if this was done, the total carbonizing period could be reduced. Mr. Cross did not favour reinforced concrete, on account of cost; but the excess over steel was only 25 p.ct. Breeze blocks would not carry the weight, and certainly would not withstand the lateral thrust, of the coal. If brick was used, the thickness would have to be considerable, and additional support would probably be necessary. The length of the conveyor had been commented on; but he knew of one which was one-sixth of a mile long, and which gave no trouble. As a matter of fact, the length could be extended almost indefinitely. Mr. Lacey had asked for figures relating to the reduction in gas-yielding properties of stored coals. Well, he had knowledge of coals which had produced 1000 c.ft. of gas less per ton after being stored; and the better the coal, the greater the loss. With regard to the method of feeding the conveyor buckets, horizontal slides were used. The quantity of coal stored in the overhead hoppers for a bench of seven settings was 119 tons, which was equivalent to 24 hours' supply. Mr. Gardiner said he did not like elevators. Unless the feed was well regulated, the power consumed was unnecessarily high. He agreed that, for horizontal conveying, rubber belts were better than gravity-buckets, as the former had a larger capacity.

Mr. Leonard Lacey proposed, and Mr. Newton Booth seconded, a vote of thanks to Mr. Gardiner for his paper; and this was heartily accorded.

Ignition Limits of Methane.—A paper on "The Limits of Inflammability of Firedamp and Air," by M. J. Burgess and R. V. Wheeler (Safety in Mines Research Board Paper No. 15), has been published by H.M. Stationery Office, Adastral House, Kingsway; price 6d. net. The authors state that a marked effect on the limits is produced by the direction the flame can take—an effect which can be explained as being that of convection currents. The widest range of inflammability occurs during upward propagation of flame, and the narrowest during downward propagation, while for horizontal propagation the values are intermediate. For horizontal propagation, there does not appear to be much difference in the limits whether the mixture is totally confined or is free to expand. For upward propagation, however, the lower limit is least when the mixture is free to expand, and the upper limit is greatest when the mixture is totally enclosed. The presence of water-vapour in the atmosphere does not appreciably affect the lower limit of inflammability. The reduction of the oxygen-content of the air narrows the limits. If the reduction of the oxygen-content is brought about by the addition of carbon dioxide, the limits are narrowed more rapidly, owing to the specific heat of carbon dioxide being higher than that of nitrogen. The effect of the presence of another combustible gas is dependent on the nature of that gas, and can be calculated from the known values for its limits of inflammability with air alone.

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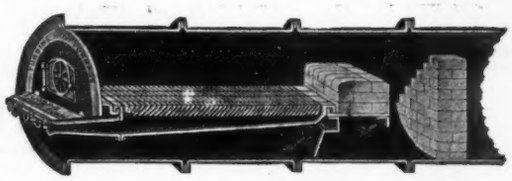

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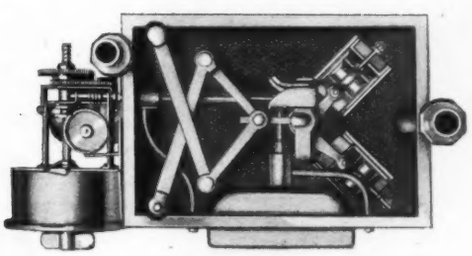

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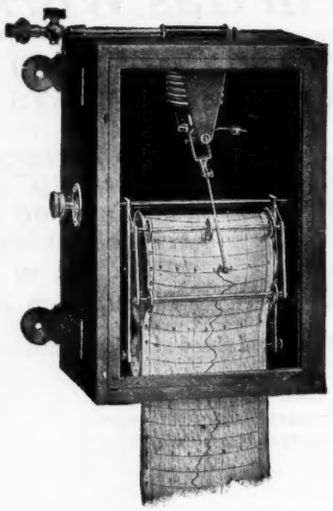

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Telegrams—"BRADDOCK, OLDHAM." Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1.

Telegrams—"METRIQUE, LAMB, LONDON." Telephone No. 2412 HOP.

COKE COMPETITION PAPERS

Which obtained the Ten-Pound Awards in Section III.

(*Continued from p.* 218.)

SALE AND UTILIZATION OF COKE.

By "PUBLICITY PAYS."

[W. H. BECKET, of the Gas Light and Coke Company.]

SALES ORGANIZATION.

Coke is not a competitor of gas, but is in every way complementary to it. As the whole country is covered by competent salesmen attached to the gas sales departments, the cheapest and most efficient method of elaborating the necessary selling organization for coke will be to entrust coke sales to the trained gas salesmen, and strengthen their numbers to meet the additional work.

There are four ready methods of bringing before the public the service that coke can render in home or factory:

1. Through the public Press.
2. By a personal canvass of customers or prospective customers.
3. By a letter campaign.
4. By coke exhibits in the gas showrooms.

The second and third methods are closely allied, and it has been demonstrated that if a letter campaign is to be fruitful, it should have a 100 p.ct. chance of creating interest. To prepare this type of letter, we must first know the opportunities, for the utilization of both gas and coke, existing in the premises to which the letter is being addressed. This information can only be obtained through a personal visit by a salesman, who should be introduced by a positive "attaining entrance" letter, definitely stating that a special representative will call on a certain day. It will be found good practice to state the name of the representative. This gives a valuable personal touch. The customer's interest can be created by an offer of the service of an expert, to see that the existing gas apparatus is efficient and is giving the best duty for the money expended.

Once having gained admittance, the salesman should make the most of his opportunities in advancing the claims of coke and gas and making sales, but at the same time he should keep faith with the offer made by the gas undertaking, and give the expert advice promised. He should be supplied with a simple form to enable him to make a record of the gas and coke apparatus in use, and the opportunities for the extended use of these fuels. A card index should be prepared for all possible customers, and the records of opportunities for extended business should be marked on the cards as the examination of each premises is completed. Having all this information available, and a suitable staff to handle inquiries, everything is in readiness for the letter campaign, which has already proved its effectiveness in gas sales.

THE PROFITABLE MARKET.

There is no suggestion that other markets should be ignored, but it would be wise to concentrate the initial effort on the domestic business. The demand for coke for domestic boilers is a constant load factor. It has been estimated by experts that, if every gas consumer in the country could be induced to take a ton of coke per annum, it would absorb all the output of the gas undertakings. Each coke boiler uses about five tons a year, so this is the market to develop.

Salesmen should be furnished with a simple handbook, setting out the pitfalls they must avoid in arranging for the installation of domestic coke boilers, and containing other data, such as the capacity of each type of approved coke boiler on the market, and the grade of coke fuel which will give the best result.

COSTS OF HEATING WATER.

The heat required for a standard bath (20 gallons raised through 100° Fahr.) is 20,000 B.Th.U.

Electricity (say) 100 p.ct. efficiency	=	$5\frac{1}{3}$ units at	2d. = 11d.
Gas . . ,, 90 p.ct.	=	$\frac{1}{4{\cdot}5}$ therm at	9d. = 2d.
Coke . . ,, 70 p.ct.	=	$2\frac{1}{2}$ lbs. at 42s. 0d. =	$\frac{1}{2}$d.

For the domestic bath, it would only be necessary to raise 20 gallons through 70°, with a corresponding reduction in fuel.

MAKE THE TRADE A CO-PARTNER.

It would not be policy for the gas industry to extend their efforts too far. The large builders' merchants and heating engineers have to be considered. At present the sales of domestic coke boilers amount to some 1000 per week. About 95 p.ct. are supplied through the builders' merchants; and of the remaining 5 p.ct. the gas industry is responsible only for a small part. The effort now proposed by the industry must not interfere with the existing business, but should aim at augmenting it. This end can be served by careful watching of sale prices, and guarding against any price cutting. If this is indulged in, it will have the effect of bringing us into competition with the existing sources of distribution, which would be disastrous.

The trade must be taken into co-partnership with the gas industry; and this can be done by increasing the demand for coke-using apparatus by advertising. This will assist the merchants; and, by maintaining prices, we shall also maintain their friendship.

With central heating and similar big installations, an even closer co-partnership can be arranged. This work, if undertaken by the gas industry, would require large highly-trained staffs.

A better way would be to make arrangements for such installations to be carried out by approved firms of heating engineers, working as sub-contractors to the gas industry. This would bring about a close and effective co-operation, which would improve our relations with the trade, and would work to the material advantage of both parties. This is equally true of steam raising and the industrial application of coke—the gas industry creating the demand and providing the salesmen, the engineering firms assisting with the technical information and carrying out the work.

GRADING COKE.

Standardization should be effected, if possible.

The following table could reasonably become standard practice:

Standard.	Description.	Suitable for
No. 1 . .	Unbroken	Large central heating plants, industrial, and steam raising.
No. 2 . .	Broken	Open fires, steam raising, and industrial when rapid work is required.
No. 3 . .	Washed coke nuts .	Independent domestic coke boilers, kitchen ranges.
No. 4 . .	Washed forge . . .	Anthracite stoves, domestic coke boilers of small grate capacity.

Standardization could conceivably be carried a step further, by registering and protecting our trade description of coke. This not only should enable the industry to secure the continual sale of suitable coke by means of contracts, but would educate the public into specifying gas coke.

FEED THE DOMESTIC GRATE WITH COKE.

The coke exhibit at Wembley has done a valuable duty. It has not only shown the public that the existing domestic grate will burn coke perfectly, but it has also convinced the gas industry that this is, beyond doubt, opening up a new field. It has been clearly demonstrated that any modern coal stove having firebrick sides and back is suitable for burning coke.

This new outlet for coke should be featured in our showrooms and local advertising without delay, as its application entails no installation work, other than replacing the iron bottom fret with solid firebrick tiles. No special technical knowledge is required by the salesmen; and as there are thousands of these modern grates in existence, this is a fruitful field to explore at once.

The consumption on a grate 16 in. wide, built with fuel up to a height of 12 in., is about 20 lbs. of broken coke in twelve hours, but this is a deeper fire than would be used under ordinary domestic conditions, and the fuel consumption could be reduced to about 15 lbs., at a cost of from 3d. to 4d. per day.

CENTRAL HEATING AND STEAM RAISING.

In some estimates based on present-day prices, the superiority of coke is undisputable.

	Per Ton Delivered. s.	d.
Coke	33	6
Leicestershire steam coal	37	6
Notts. hard ,, ,, ...	40	6
Smokeless Welsh navigation steam coal	43	6
Petroleum fuel oil Standard Mexican	85	0

Assuming the above-mentioned fuels to be of good average calorific power, the relative cost, on a thermal-value basis, would be approximately as follows:

	B.Th.U. (gross) per Lb.	B.Th.U. per Penny.
Coke	12,000 ..	66,000
Leicestershire steam coal	13,000 ..	65,000
Notts. hard ,, ,, ...	14,000 ..	59,600
Smokeless Welsh navigation steam coal	14,500 ..	62,300
Petroleum fuel oil Standard Mexican .	18,400 ..	40,000

Fired under conditions most suitable for each class of fuel,

the following average net evaporative values may be taken as approximately representative:

	Evaporation per Lb. of Fuel from and at 212° Fahr. Lbs.
Coke	9·0
Leicestershire steam coal	9·0
Notts. hard ,, ,,	9·5
Smokeless Welsh navigation steam coal	10·5
Petroleum fuel oil Standard Mexican	16·0

Based upon the above data, the comparative fuel cost of evaporation with coke, coal, and oil would be approximately as follows:

	Fuel Cost per 1000 Galls. Evaporated. s. d.
Coke	16 7
Leicestershire steam coal	18 7
Notts. hard ,, ,,	19 0
Smokeless Welsh navigation steam coal	18 5
Petroleum fuel oil Standard Mexican	23 8

In the above comparison no allowance has been made for the cost of ash removal in the case of the solid fuels.

The general impression among steam users is that coke is not a desirable fuel. This impression has been planted by our competitors, and is fostered by an efficient selling staff. A counter-move by our own selling organization, supported with test figures such as quoted above, will break down this opposition, and increase our sales in this direction enormously.

SALE AND UTILIZATION OF COKE.

By "TEM."

[JOSEPH C. TAYLOR, of the Gas Light and Coke Company.]

While the quantity of coke supplied for special industrial purposes must of necessity fluctuate with the conditions of trade, the present state of the markets shows clearly that the use of coke for domestic purposes is not making headway, resulting in the accumulation of large stocks at the gas-works. The cause is in large part the fact that the public have not yet realized the advantages of coke as a fuel, and partly that the producers have not yet organized the necessary campaign to promote that realization.

The first steps necessary are the removal of the prejudices and popular misapprehensions concerning coke; among these being the alleged injurious effects, large sulphur content, low calorific power, and the supposed need for "damping down" before use. These and other equally well known objections must be refuted publicly in a convincing manner.

Another strong point which cannot be too greatly emphasized is the necessary co-operation with the manufacturers of coke-fired apparatus, and the extension of the activities of the London Coke Committee by the formation of a National Coke Committee giving a greater scope to their aims concerning the production of domestic and industrial appliances for the use of coke as a fuel, and the necessary publicity as to the advantages of those appliances.

The methods of coke production and preparation have a vital bearing on the work of the sales organization, the salesman's field being determined only by the utility of the article sold.

The sales organization must be equipped with definite standard specifications to which various grades of coke conform, to meet the specialized requirements of industrial practices.

In view of the general uncertainty and present apathy of the export market, it is on the development of the home market—more especially the domestic section—that the gas industry must concentrate its efforts. To be successful, the campaign must be general, and must not rely merely on the enterprise of a few isolated undertakings.

REMOVAL OF EXISTING PREJUDICES AND FALLACIES.

Objections to the use of coke could best be dealt with in an educational pamphlet to be issued by the National Coke Committee. This pamphlet would form part of the standard literature used in the organization of a sales campaign.

The alleged "injurious effects" include both the health of the user and also the life of appliances. Instances can be quoted to show that the health of employees engaged in coke practice is in no way impaired, and that the life of coke-fired apparatus is comparatively longer than that where coal is used. The odour of sulphur present in coke (the "fixed" sulphur of raw coal) can be a real objection only when coke is burnt under improper conditions. This can be a sound point in the support of the installation of suitable coke-fired appliances. The "low calorific value of coke" is a subtle statement often emanating from the coal trade, who regard coke in the nature of a sucked orange. It can be clearly shown that coke is the more economical fuel when the values of coal and coke are compared on a thermal basis. Figures should be given, and actual results cited. "Damping down" coke before use retards combustibility, and in consequence reduces the value of coke as an economic fuel.

There are other objections based on legitimate grounds—namely, those regarding the quality or fuel value of the coke supplied, and the failure to get good results with existing appliances. The remedies lie largely in the hands of the gas undertakings on the one hand, and the manufacturers of appliances on the other.

The application of coke to existing grates in domestic use is, generally, not a success—especially in the case of the open or barless type of grate. The failure of the coke to burn actively, with consequent low temperature, often results in an absence of a chimney draught strong enough to take off the products of combustion (the intensity of the draught depending largely on the temperature of the combustion products), in consequence of which the products escape into the room, giving rise to the "odour" objection to which reference has already been made. Therefore it is desirable to place on the market a device readily adaptable for use in existing grates, to promote active combustion by induced or convection air-currents. Such a device might take a modified form of the serrated fire-brick back (one of the principal features of the "NC." coke-fired grate by Messrs. R. & A. Main), to work in conjunction with a closed-in false bottom to permit of the necessary air adjustment.

On the other hand, now that greater attention is being paid to the preparation and grading of coke, there is no doubt it forms a most economical and efficient fuel which will burn in all modern grates without difficulty. Especially is this true where the coke has been dry-cooled by the Sulzer system.

FORMATION OF A NATIONAL COKE COMMITTEE.

There are upwards of forty firms specializing in the production of coke-fired appliances for domestic purposes. When the functions of the London Coke Committee are reviewed, it is at once apparent that a National Committee, operating on the same lines, would result in a much closer co-operation between these manufacturers and the gas industry. The functions of the National Committee would be chiefly advisory. It would not sell coke directly, nor would it trade in appliances. It would:

(*a*) Define comprehensive and standard specifications to which various grades of coke conform.
(*b*) Circulate for staff information technical papers in abstract form, quarterly.
(*c*) Test appliances submitted by manufacturers, and compile a standard catalogue of apparatus recommended.
(*d*) Suggest suitable apparatus for showroom demonstration.
(*e*) Arrange full and frequent Press advertisement.
(*f*) Compile and circulate to gas undertakings:
1. Suitable literature for public education.
2. Literature with special appeal to gas consumers—as it is within their power to lower the price of gas.
3. Suggested form-letters for postal work.

One of the most important functions of the National Committee would be the organization and direction of the sales campaign. The direction of this campaign by a central body is essential because, otherwise, the spade work is left to a few undertakings with vision, and the result of their enterprise can be but local in its results. Local requirements may to some extent necessitate special methods, but generally the consideration of national requirements is expedient.

In operation the organization would be regional.

England and Wales	1146 undertakings	4 regions*
Scotland	244 ,,	1 region
Ireland	97 ,,	1 ,,

*Northern, Midland, and Southern; and Wales.

Each regional office would collect from the undertakings within its province the data necessary to develop a cohesive, adaptable, and effective selling force, and would be responsible for the requisition of the literature and publicity matter from headquarters.

Each undertaking would arrange its own canvass and follow-up work, supply coke from its own stock, and pass orders for appliances through its existing stores system. Stocks of coke in hand would be reported to the regional office periodically, so that, in the event of demand exceeding supply, the coke required would be obtainable from a neighbouring undertaking having a surplus on hand.

The regional offices could also be fitted with laboratories containing suitable apparatus for the analysis of coals, in order that the smaller undertakings in each region might have the facilities to ensure their obtaining selected coals of a known value.

The question naturally arises as to the necessary financial backing to make possible the establishment of the scheme. A tax of 3d. per ton on the output of coke for sale (each undertaking paying on its own output) on the basis of an annual saleable quantity of 8 million tons would represent an income of £100,000 per annum.

DEVELOPMENT OF COKE MARKETS.

The home market may be divided into two sections, the industrial and the domestic. In the industrial market, the competition with colliery coke ovens, largely due to the declining export market, has now become a serious factor; and the preparation and sale of coke to meet the specialized needs of industrial practices are largely in the hands of coke oven producers. Notwithstanding the desirability of extending the industrial market, the gas industry has, in the exploitation of the domestic

market, the means for the complete disposal of their output of coke.

The annual quantity of gas coke to be disposed of in all markets approximates 8 million tons. The receipts for residual products largely determine the price to be charged for gas. The gas consumers number 8,500,000. Therefore, if public opinion can be educated to tolerate the change of solid fuel from coal to coke, gas consumers alone, by taking their "per head quota" of coke, would completely absorb the available stock to their own advantage. A campaign organized by the National Coke Committee to this end must of necessity be national in its scope.

GAS SERVICE AT GOLDERS GREEN.

APPRECIATION OF THE GAS LIGHT AND COKE COMPANY.

In response to the invitation of the Governor and Directors of the Gas Light and Coke Company, a large number of visitors were present last Thursday afternoon at the formal opening of new showrooms and offices at Nos. 110-114, Golders Green Road, N.W. The ceremony was performed by Mr. C. C. Cartwright, J.P., the Chairman of the Hendon Urban District Council; and the majority of the guests were, of course, resident in the district, or those having interests there. With what they saw, they were obviously well pleased; while those coming from farther afield than Golders Green, Hendon, and Hampstead, had the additional gratification of noting the cordial relations subsisting between the Company and their consumers. The consumers recognize that they are well served; and the Company are determined that they always shall be so. Could any surer foundation exist for permanent prosperity?

Within the area which the new showrooms and offices are intended to serve there are already some 17,000 gas consumers; and the population is growing rapidly. This fact, and the still more significant fact that the demand for gas fittings and appliances has been increasing much more than proportionately to the increase in the number of residents, made urgent the need for an extension of the Company's means of serving the public. This extension has been secured by the building on freehold land of premises which are ample in accommodation and so designed as to be an acquisition to the important business thoroughfare in which they stand.

THE OPENING CEREMONY.

As has been remarked, the opening ceremony was performed by the Chairman of the Hendon District Council (Councillor C. C. Cartwright), who was accompanied by Mrs. Cartwright, and was supported by many of the other members and the principal officers of the Council, as well as leading members of the local Chamber of Trade and prominent residents in the district. The visitors were welcomed by the Governor of the Company (Mr. D. Milne Watson, D.L.), and three other members of the Court of Directors—namely, Mr. Thomas Goulden, Mr. Harold Hartley, and Mr. H. W. Woodall. With the Directors there were the Assistant General Manager (Mr. R. W. Foot), the Secretary (Mr. W. L. Galbraith), the Chief Engineer (Mr. T. Hardie), the Accountant (Mr. H. E. Ibbs), the Rental Superintendent (Mr. L. M. Simmons), and the Chief Officer of Stores (Mr. W. M. McDowall); as well as, of course, the Controller of Gas Sales (Mr. F. W. Goodenough), the Deputy Controller (Mr. Stephen Lacey), Mr. E. L. Sutton (the Inspector-in-Charge of Golders Green District), together with the other senior officers of the Gas Sales Department, to which is entrusted the task of giving good service to the 1,100,000 consumers in the Company's area.

Mr. MILNE WATSON said it was a very pleasant duty to extend a cordial welcome to the Chairman of the Hendon Urban District Council, who had been kind enough to come there to open the Company's new showrooms, as well as to the other members of the Council and so many prominent residents in the district. There might be doubt on the part of some of those present as to why the Company should have moved their showrooms a little further out. The Directors felt it would be a great advantage to have really first-class premises, rather than the cramped position they had hitherto occupied. Further, it was, of course, a distinct gain to possess freehold land, on which they could so build as best to meet their requirements. The Board were convinced that the provision of perfectly equipped showrooms and offices would add to the convenience of customers and lead to a substantial increase in business.

A WELL-ORGANIZED UNDERTAKING.

Councillor CARTWRIGHT said that, on behalf of the Hendon Urban District Council, he welcomed the opportunity of performing this small duty of declaring the new premises open; and he proceeded to make some highly appreciative remarks with regard to the Gas Light and Coke Company. Go where they might, he declared, he did not suppose they would find a better organized undertaking, whose area stretched from Windsor to Epping. Speaking as a member of the Local Authority, there was one way, in addition to the supply of gas, in which the Company were of assistance to them. This was in connection with the Juvenile Employment Committee, which was associated with the Education Committee of the Council. As far as they were able, the Company took their boys; and it was not the fault of the Company, but of the boys, if they did not remain in their employ for the rest of their lives. This was the sort of co-operation that the Council desired to foster. The Company also practised co-partnership, which was another excellent thing. He had with him a cutting from "The Times," from which he noticed that for the past year the ordinary shareholders of the Company were to receive a total dividend of £5 2s. For each of the preceding four years, dividends of the Company showed a progressive increase; the distribution for 1924 being £5 6s. 8d. But a reduction for the past year was foreshadowed by the increase which the Company had made in the price of gas—an increase which had been rendered necessary by a serious reduction in the revenue derived from coke and other residual products, and by the increase in wages paid since the beginning of the year. Well, there was no suggestion of profiteering here. It seemed that, contrary to the usual course of things, the higher the price the Company charged, the smaller the amount received by shareholders in the form of dividend. Speaking of service, Councillor Cartwright asked: "How often does your gas fail you? Very rarely indeed. Let us give the Company full credit for serving us day in and day out. I have great pleasure in declaring this building open; and I hope that the Company will continue to prosper, as they deserve to do." [Applause.]

IMPORTANCE OF GOOD OUTSIDE LIGHTING.

Mr. MILNE WATSON voiced the thanks of the assembly to Councillor Cartwright and his wife, who accompanied him, and went on to point out that Golders Green was one of the most rapidly growing districts in the Company's area. At the present moment there were no less than 17,000 consumers there; and if the number continued to grow as rapidly as during the last few years, it would very soon be doubled. This was one of the reasons which had led the Directors to offer increased facilities to the inhabitants for becoming acquainted with the best and latest appliances for the utilization of gas. So much was being heard about electricity to-day that those who did not know the facts might almost be pardoned for imagining that the day of gas was over, and that super-stations were destined to bring about the millennium. He could, however, assure them that the millennium was not likely to arrive in this way, and that what had been accomplished in the way of purifying the atmosphere had been mainly due to the extended use of gas heating apparatus. The gas industry had received but scant recognition of its services, though he was glad to see that the Prime Minister had, the previous day, admitted that gas had its uses, and that there was no reason why it should not go on serving the public in conjunction with electricity. Of course, electricity had great uses; but at the same time there were certain fields in which it could not touch gas—particularly in the realm of heating. There would be plenty of good service to be rendered by both gas and electricity in the future; and he could assure them that gas would not fail them. The great ambition of the Company was to see an important shopping centre, like that in which the new showrooms were situated, well lighted. This would render the thoroughfares more attractive, and give those who had not the opportunity of doing so during the day a chance of seeing the shops and making their purchases in comfort. He hoped it would be possible to come to some satisfactory arrangement for adequate outside shop lighting.

ACKNOWLEDGMENTS.

Councillor CARTWRIGHT, in acknowledging his kind reception, said that whenever any question with regard to the price of gas had cropped up, Mr. Goodenough had met the Council in the admirable spirit that one would expect from an officer of such a Company. It was true that on all occasions Mr. Goodenough had prevailed upon them that his point of view was the correct one; but this was because it was correct. He also made acknowledgment of the excellent services rendered by Mr. Sutton in connection with the Juvenile Employment Committee.

This portion of the proceedings was concluded by the presentation to Mrs. Cartwright of a bouquet, by Miss Muriel Mellish, the daughter of one of the Golders Green showroom attendants. Tea was afterwards served in the general offices, where music was also provided and the visitors made a tour of inspection of the premises.

THE SHOWROOMS.

The main part of the showrooms is on the ground floor, where there are also cashiers' desks, at which consumers may pay their accounts. Further appliances are shown on the first floor, where, in addition, are situated the offices of the Inspector-

in-Charge and other members of the staff appointed to deal with public service. The window space is extensive, and is fully open to the showroom; thus making a strong appeal to the interest of the passer-by. The general arrangement leaves nothing to be desired. This is to say that the Architect (Mr. W. J. Tapper, F.R.I.B.A.) responsible for the design, arrangement, decoration, and furnishing of the premises, and the contractors (Messrs. Chinchen & Co.) have done their work well. In fact, the Company have here set up a standard which even they will find hard to beat.

The colour scheme, in restful tones of grey and cream, has a very pleasing effect; and the main lighting is well carried out by means of semi-indirect lamps, all connected by switches for convenience of lighting and extinguishing. Practically every type of appliance needed for domestic use can be demonstrated in actual operation; while so far as lighting is concerned, no visitor to these showrooms will afterwards be able to deny that gasfittings can be procured which will meet the most exacting requirements from the artistic point of view.

INCONTROVERTIBLE FIGURES.

To sum up, the Golders Green new showrooms afford a striking example of the policy which has led in recent years to the greatest expansion that the gas industry has experienced throughout its history, and which is causing every year a greater increase than the last in the demand for gas appliances. The figures given by the President of the National Gas Council (Mr. D. Milne Watson) in evidence before the Coal Commission emphasize this expansion. He stated that the make of gas in this country had increased from 160 thousand million c.ft. in 1903 to 219 thousand millions in 1913, to 260 thousand millions in 1923, and to 275 thousand millions in 1924—an increase of 75 p.ct. in 21 years. This increase took place in a period during which great improvements were being effected in the efficiency of gas appliances (resulting in marked economies in consumption) and a very great expansion was taking place in the electrical industry. During the same period, the gas appliances sold or let on hire by the Gas Light and Coke Company increased by 850,000.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Government Electricity Scheme.

SIR,—Gas companies will shortly be holding their annual meetings. May I respectfully suggest that Chairmen at these meetings should take the line, when adressing the shareholders, that this Government electricity scheme is the finest compliment that the gas industry has ever received. They would, no doubt, elaborate this idea by indicating such points as the following:

The gas industry with its great and *natural* growth requires no State aid.

That to subsidize is to coddle an industry.

Coddling produces an unhealthy growth.

When a gas-works handles a ton of coal, it returns to the public 80 p.ct. of the heat content of that coal, whereas an electricity works only returns at the most 20 p.ct. of the heat.

It is admitted that many years must elapse before the scheme will produce any effective results. In the meantime, who will provide the interest on the millions of money which must be spent on the scheme—the taxpayer, or the electricity consumer?

DOUGLAS H. HELPS.

Reading Gas Company,
Jan. 30, 1926.

Does the Gas Industry Need Overhauling?

SIR,—Your timely "Editorials" on the above subject have started a hare, which seems to me no leveret, but a well-fed old-stager whose manifold offences have merited a good run and a kill. Therefore I ask you, if you think my suggestions worthy, to give them publicity, together with those from better-known pens, in the "Correspondence" columns of the "JOURNAL."

You, Sir, are aware, as are your readers, of the splendid work and the magnificent development which are being registered in a large section of the gas industry. We hear of the wonderful annual increases in the gas and appliance sales of the Gas Light and Coke Company; we learn of a front-rank provincial company installing a hundred fires a week under the nose of a pushing and somewhat unscrupulous municipal electricity undertaking; we have a comfortable feeling of pride as we relate the gratifying results of serving and satisfying our consumers. But is there not another story to tell? I have formed the opinion that beyond this bright and smiling landscape lies a vast field where gas men are playing a losing game, in which, if the forwards do get the ball, the outsiders fail—through inefficiency, or lack of dash and initiative, or through selfishness—to press the advantage, and individually let-down their side. Have the "big men" and the "live wires" of the industry watched that losing game? Or has the glare from the sunny fields obscured their view?

Speaking more directly, I refer to dozens of small and medium-sized undertakings where the "take-it-or-leave-it" attitude of our great-grandfathers still prevails. Having lived in their areas of supply, having experienced their methods, and having information as to the intelligence possessed by my neighbours regarding gas uses, I can say that 90 p.ct. of the customers of such concerns have never heard of a gas-iron or seen a decent-looking gas-fire, and consequently would offer the electrical wiring contractor a free bed and lodging for a week to give them relief from a miserable gas existence, due solely to an abiding lethargy on the part of the suppliers.

I could give you concrete examples to illustrate my "grouse;" but I fancy those at whom I am "getting" do not much interest themselves in the burning question at the head of this letter. Further, my examples would seem trivial and easily rectifiable. But these "trivialities" of old-fashioned and inefficient appliances, multiplied by thousands, are burnt offerings to the Goddess of Discontent, who inspired the exaggerated anti-gas campaign in the Press a few years ago, and who makes a large section of the public stretch out their hands in welcome to electricity development.

It seems that there is a strong and immediate necessity for missionary work among these backward gas people, who should be shown the error of their ways and the advantages which will quickly accrue from properly equipped showrooms in the proper places, and from a policy of taking an interest in the consumers, even to the extent (what a shock to the wayward Directors!) of total or partial maintenance.

If missionary work does not quickly bring converts—if the trading concerns will not take the risks in anticipation of increased profits (as advocated in the "JOURNAL" last week by Mr. Herring)—then by all means let us work for the "gas grid" which he adumbrates. Anyway, I wish a big undertaking would throw out its distributing arms, and take to its bosom the area in which I reside—with its greatest drawbacks, the gas supply and the indifference of its providers, which conditions other experience tells me need not continue.

RURAL "CONSUMER."

Feb. 1, 1926.

Importance of the Gas Mantle Industry.

SIR,—Long acquaintance with, and interest in, the gas industry induces me to write these few lines on a matter which seems to merit special attention at the present time, when electrical schemes of great scope are being diligently pushed in influential quarters. The matter is briefly this: Both the gas industry and the electricity industry can supply light, heat, and power; and consequently there is considerable competition between the two industries. In the heating section of its business, gas holds its own; but in the lighting department the rivalry is especially severe. All the more reason, therefore, why the gas industry should support and strengthen, to the utmost, this branch of its business. In gas-lighting matters, however, great changes have been made of late years. The candle-power standard of the gas supplied has been done away with, and a thermal value substituted. This means that the gas now supplied has in most cases very little lighting value, and that the user is thrown back on the incandescent mantle if he wishes to obtain illumination. In other words, the incandescent mantle has assumed such an important position in the gas industry that the lighting branch of the latter is really dependent on the mantle. If anything interfered with the production and supply of mantles, the lighting load of the gas industry would be equally affected, so that the importance of the mantle trade to the gas industry can hardly be overestimated.

A few gas undertakings in this country have interested themselves in the production of mantles, and it seems reasonable to think that, considering the dominating position which has been accorded to the incandescent mantle by the introduction of the thermal standard for gas, the welfare of the mantle trade ought now to be a matter of special concern to the gas industry as a whole, and that whatever can be done to strengthen that very necessary subsidiary trade should be the general care of the gas industry. The writer ventures to submit that both the supply of the necessary rare earths and the production of mantles in this country merit all the safeguarding that can be bestowed on them with a view to making the manufacture of mantles a strong home industry, able to supply goods which in both quality and price would meet all requirements, and would give the gas industry the help it needs in its lighting branch in competition with electricity.

WILLIAM H. HARVEY.

77, Montholme Road,
Wandsworth Common, S.W. 11,
Jan. 30, 1926.

Presentations at Portsmouth.—Presentations were made to 21 employees of the Portsea Island Gas Light Company who have recently retired on pension, at a concert arranged by the Company's Social and Athletic Club in the Angerstein Hall, North End, Portsmouth, on Jan. 25. The presentations were made by the Chairman of the Company (Mr. T. H. F. Lapthorn, J.P.); each of the recipients, the first eight of whom had an average service of 46 years, having been allowed to make a choice of a gift, up to a certain amount, as a parting token of the Company's thanks for loyal service. Easy chairs, a gold watch and chain, a barometer, and a gramophone figured among the presentations; and for each employee Mr. Lapthorn had a cheery comment and a hearty handshake.

REGISTER OF PATENTS.

Carbonization of Shaped Fuel.—No. 245,190.

ILLINGWORTH, S. R., of Radyr, THE ILLINGWORTH CARBONIZATION CO., LTD., of Manchester, DEMPSTER, R., & SONS, LTD., and TOOGOOD, H. J., both of Elland.

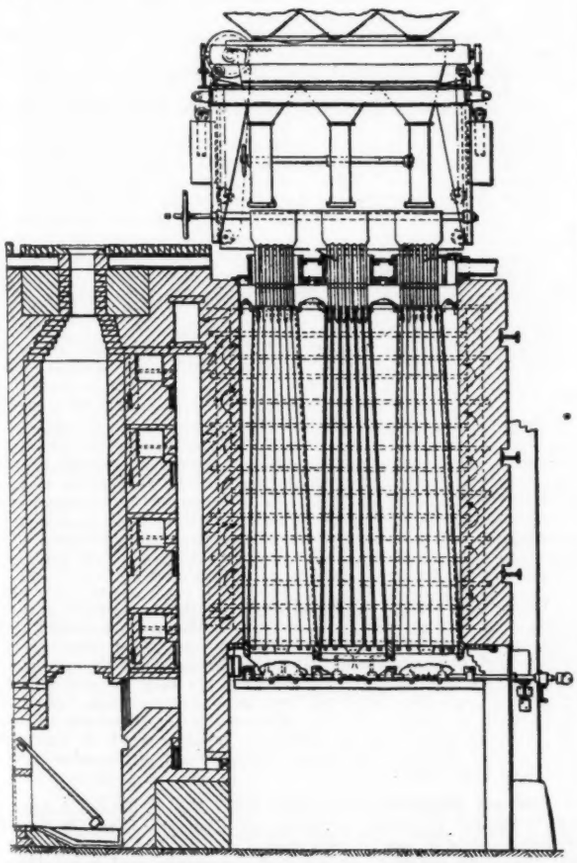
No. 22,705; Sept. 25, 1924.

This invention relates to apparatus for the manufacture of carbonized fuel, particularly shaped fuel produced by the carbonization of coal suitably preheated, or blends of coal, or coals which are suitable without pre-treatment—namely, which do not expand during carbonization.

The apparatus comprises a brickwork setting, a nest of metal tubes forming retorts, and tubes of refractory material that extend outside the metal retorts. Usually a plurality of nests of metal tubes is provided, and outside each nest extend tubes of refractory material—that is to say, the tubes extend outside the nests and between each nest. The brickwork setting may be made of any refractory material; and of tubes of refractory material are not built up, but are composed of individual tubes forming separate units, so that a defective one can easily be withdrawn and a new one inserted. The metal tubes are preferably of cast iron, and may be formed in one piece, or two pieces bolted together, or of plates of H-section. When the tubes are of circular section, the diameter of the circle is less than 7 in. but greater than 2 in.; and when of elliptical cross section their minor axis is greater than 2 in. but less than 7 in.; and when the tubes are built up of plates, they should be less than 7 in. in width but greater than 2 in. In all cases the tubes are preferably tapered, the taper being not less than $\frac{1}{10}$ in. per foot of height. Tubes of larger dimensions may be used; but those set out are best from the standpoint of efficiency.

In the first two cases mentioned the metal tubes are so mounted that any one can be withdrawn independently of the others. The tubes of refractory material extending outside the metal tubes are each separate units, thus enabling the retort to be easily built and repaired.

As described in the specification No. 223,624 [see "JOURNAL," Vol. 168, p. 665], the apparatus may be provided with a chamber below the retorts which may be used as a cooling chamber or for further carbonization of the fuel. The apparatus also may be combined with a gas producer and a regenerator. The apparatus may be fed with coal either intermittently or continuously. In the latter case a continuously moving door is provided at the bottom of the retorts.



Briquette Carbonizing Plant.—Illingworth Carbonization Co., Ltd., and Robert Dempster & Sons, Ltd.

The vertical section which we reproduce indicates the design of one form of setting according to the invention. On the left is seen the producer, the gas from which passes through into a main vertical flue, whence it is supplied by way of dampered passages at varying heights to the setting proper. Thus zoning and full control of heats is attainable, and consequently regulation of the product—from smokeless fuel of high combustibility to fuel of lower combustibility but pronounced density.

The setting is easily turned-over to coal-gas firing; burners and air inlets being provided for the purpose.

No. 244,837 (No. 22,706; Sept. 25, 1924.)

This invention is for a modification of the apparatus claimed in No. 245,190 (above); the object being to overcome the lag in the carbonization experienced with the radiant heating of the retorts.

According to the present invention, the central zone of the metal retorts is heated by the hot gases from the flues; the result being that the retorts are heated both by radiant heat and by conducted heat. In order to carry this out, separate tubes of refractory material forming horizontal flues are provided arranged adjacent to the metal retorts, and in some cases at about a quarter of the height and also at the middle of the nests; such flues being at right angles to the other flues and passing between the metal retorts.

The arrangement is fully described and illustrated in the specification; other claims being that "the upper ends of the retorts communicate with a header and are held by rings; and trough plates above the rings and the lower ends have flanges of such a size resting on a base plate that the retorts are free to be withdrawn through the header." And "the heating gases burnt in an upper zone of flues pass through a cross-over flue and downwards between the retorts, and heating gases burnt in the next lower zone of tubes pass through a lower set of cross-over tubes and join the down stream of the gases from the first set of cross-over flues."

Drying or Preheating Coal.—No. 244,505.

ILLINGWORTH, S. R., of Radyr, and THE ILLINGWORTH CARBONIZATION CO., LTD., of Manchester.

No. 21,324; Sept. 9, 1924.

This invention relates to apparatus for drying or preheating coal or like material; one object being to provide apparatus whereby coal can be dried at a low cost and whereby oxidation is reduced to a minimum.

The apparatus consists of a retort setting of metal or refractory material, preferably consisting of thin brickwork, and flue tubes of metal or refractory material, each tube forming a unit so that it can be easily manipulated—that is to say, a damaged tube can be easily replaced. Within the setting are metal retorts built up either of plates of H section or of tubes. The metal retorts preferably have a taper from the bottom to the top; and if tubes are used they may be circular or elliptical.

To provide vents for the escape of steam or gases from the coal, the tubes or plates constituting the retorts may be stepped, providing vents at each change of size. Alternatively, pipes may be placed between the plates or in the tubes, such pipes being perforated to allow of the entrance of steam or gases.

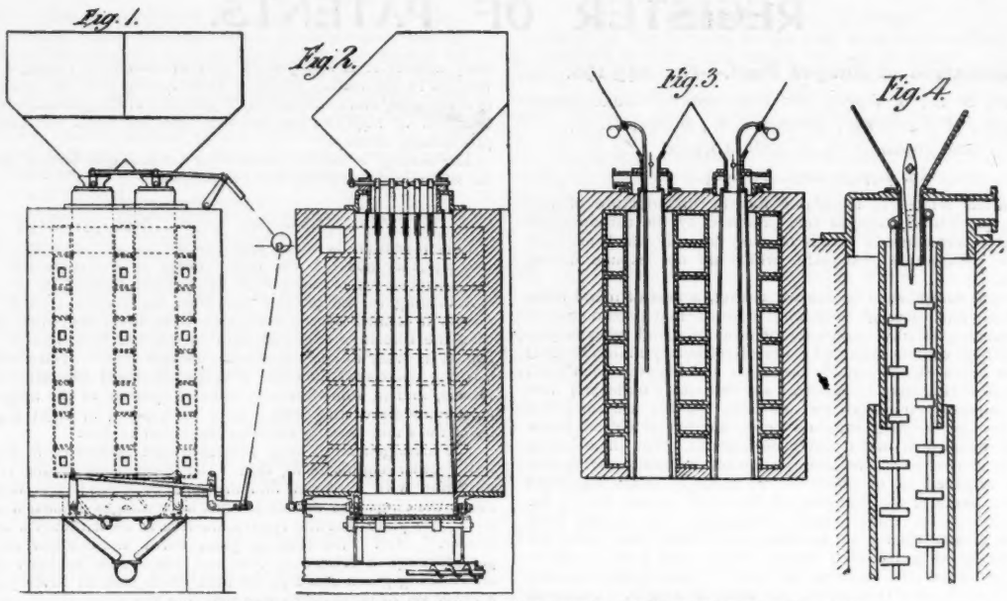
In cases in which the coal has a large amount of moisture, say 15 p.ct., the retorts may be provided with reciprocating scrapers. The steam and gases pass through the vents into the setting and thence to a chamber at the top having an offtake to which suction can be applied.

The bunkers have outlets of smaller size than the retorts, and in the outlets may be agitating arms operated from an eccentric. The discharge consists of plates mounted on rollers, which plates are caused to reciprocate by means of links keyed to a shaft which is given a to-and-fro turning movement by means of a bell-crank lever and links. The throw of the plates and hence the rate of discharge can be varied.

The apparatus may be heated by direct firing with coal gas, producer gas, or the like, which is burnt in the lowest flue tube. The products of combustion pass upwards to and fro through the flue tubes and thence to the chimney stack. Auxiliary burners may be provided at different heights. In this case the retorts are heated by radiant heat from the flue tubes, which arrangement is used in the case of preheating coal, so that the gases evolved may be recovered uncontaminated with flue gases. When, however, the apparatus is used for drying coal, the gases from the flue tubes are allowed to pass into the spaces between the retorts and their setting, and dampers may be provided controlling the passage of the gases. The dampers control the passage of the flue gases to the chimney and from every alternate flue tube to the brickwork retort setting. A similar arrangement of flues and dampers exists on both sides of the setting.

Hot flue gases from other processes—for instance, carbonizing retorts, hot gases recovered from the cooling of coke, &c.—can be used as a heating medium. For example, the coke in the cooling chambers described in specification No. 223,624 [see "JOURNAL," Vol. 168, p. 665] may be cooled by passing flue gases through it, which flue gases may be circulated in the tubes of the drier; and moisture taken up may be condensed out, and the cooled gases employed again to cool a further batch of coke. It will be observed that the heating gases do not come in contact with the coal during the drying process, whereby oxidation is avoided.

Two or more driers may be arranged in parallel, and the dried coal from them may be mixed in any desired proportion; and further, the apparatus may be used to dry coal and mix different coals as described in our specification No. 235,627 [see "JOURNAL," Vol. 171, p. 234], in which case the hot coal from the driers is passed by a conveyor beneath a wet coal bunker, the coal from which is



COAL DRYER AND PREHEATER.—ILLINGWORTH CARBONIZATION CO., LTD.

discharged by a similar mechanism to that employed for discharging the retorts. By adjusting the throw of the discharge plate, the desired quantity of wet coal can be discharged and mixed with hot coal in the conveyor.

This apparatus can also be utilized to obtain a hot blend of coals suitable for pressing into briquettes. In this case the coal passed forward from the preheater is mixed with dry bituminous coal in the required amounts. The temperature at which the hot coal passes forward is conditioned by the temperature at which the bituminous coal becomes plastic. Normally this is around 400° C., and 20 p.ct. of bituminous coal is required to be mixed with the hot preheated coal to give a briquette, consequently the temperature of the hot coal, preheated to avoid coke formation as in specification No. 164,104, is about 500° C.

The patentees point out that dust is not produced.

Of the 18 drawings which accompany the specification, we reproduce fig. 1, a side elevation of the retort setting; fig. 2, an end sectional elevation through one of the nests of metal tubes forming the retorts; fig. 3, a side sectional elevation of the retort setting showing the vent tubes which may be provided if necessary; and fig. 4, a section through one of the H section retorts, showing the stepped construction, provided in this case with scrapers.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 27.]

Nos. 1331-2059.

ALBACH, F.—"Apparatus for quenching coke." Nos. 1913, 2046.
ARKELL, H. W.—"Means for facilitating reading of meters." No. 1786.
BAKER PERKINS COMPANY.—"Tubular burners." No. 1733.
BENNETT, W.—"Manufacture of coke." No. 1830.
BROADHEAD, J. W.—See Bennett, W. No. 1830.
BUXTON, R. H.—"Charging horizontal retorts." No. 1899.
CARPENTER, C.—"Fastenings for retort doors." No. 1921.
CLAYTON, J., and CLAYTON, SON, & Co., LTD.—"Gasholders." No. 1854.
COLEY, H. E.—"Apparatus for manufacture of gas." No. 1755.
COMPAGNIE DES MINES DE VICOIGNE, NOEUX, ET DROCOURT.—"Low-temperature distillation of coal." No. 1699.
CROFT, C. M.—See Buxton, R. H. No. 1899.
DEMPSTER, LTD., R. & J.—"Gasholders." No. 1582.
DEMPSTER & SONS, LTD., R.—See Bennett, W. No. 1830.
DEUTSCHE GASGLUHLICHT-AUER-GES.—"Manufacture of refractory articles of pure oxide of zirconium." No. 1766.
GORDON & Co., LTD., J.—See Arkell, H. W. No. 1786.
HARRIS, H. E.—"Gas and oil fires." No. 1456.
HELPS, G.—"Cookers and hotplates." No. 1350.
HUMPHREYS & GLASGOW, LTD.—"Manufacture of gas." No. 1684.
JENKINS & Co., LTD., W. J.—"Discharging, &c., gas retorts." No. 1764.
KEITH & BLACKMAN COMPANY, LTD., J.—See Baker Perkins Company. No. 1733.
KOHLENVEREDLUNG GES.—"Gasification of fuels." No. 1814.
KOPPERS COMPANY.—"Coking retort ovens." No. 1927.
KOPPERS COMPANY.—"Vertical retort batteries." No. 2059.
MASON, J. F.—See Jenkins & Co., Ltd., W. J. No. 1764.
MENDEL, S.—"Safety apparatus for gas lighting appliances." No. 1613.
NAMEGAH, W.—"Gas economizer for cooking-stoves." No. 1420.
NEWBERY, I. B.—"Retorts." No. 1570.
PEAK, A. C.—"Holders for gas globes." No. 1369.
SCOTT, J. W.—See Dempster, Ltd., R. & J. No. 1582.
SHAW, C. J.—See Namegah, W. No. 1420.
STELFOX, J. C.—See Humphreys & Glasgow, Ltd. No. 1684.
WEBER, L.—"Production of coke briquettes." No. 1681.

Fife Gas Companies to Amalgamate.—Negotiations have been taking place between the Anstruther Gas Company, Ltd., and the Crail Gas Company, Ltd., with a view to amalgamation. The proposal is for the gas to be made at the works at Anstruther; the supply for Crail being transmitted by means of a high-pressure main.

Cure Colds with Coke.—Mr. Charles Taylor, of Stretford, writing to the "Daily Express," says: "With reference to the statement that no cure for a common cold has been found, if anyone suffering from a cold will inhale the fumes from a coke fire he will be cured almost immediately. The fumes, besides killing the germs, cause the sufferer to cough, and thus expel them; and the small quantity of fumes required is totally harmless."

Activated Carbon from Peat.—According to the "Chemical Trade Journal," high quality British-made activated carbon selling at a price of £8 to £10 per ton has been foreshadowed by Count Louis Hamon, in an interview. Count Hamon is the Chairman and Managing Director of Artificial Coal Products (Hamon Process), Ltd. This Company, which has an authorized capital of £200,000, has recently been founded; and the erection of a factory costing £100,000 on an estate of 800 acres in Norfolk is to be commenced. The activated carbon is to be the main product in the process for the utilization of peat that Count Hamon has worked out after 18 years of experiment; but the bye-products of the system will include disinfectants, ammonium sulphate, and paraffin wax. Until the new factory is completed, the Company have made arrangements to produce the activated carbon "Hamonite" at a temporary factory situated at Swinton, near Rotherham, and have entered into a contract with Messrs. Robert Dempster & Sons, Ltd., of Elland, to make the necessary alterations to these works.

European Gas Company, Ltd.—It is announced in our advertisement columns that in order to meet difficulties connected with the fluctuations of the franc, and for reasons of general convenience, the Board have decided to take in future the calendar year as the annual period of working, and to close the accounts of the Company at Dec. 31 last for the broken period of nine months. As soon as the necessary information is available from abroad, the Directors will make a further communication to the shareholders as to the payment of a dividend for the period April to December, 1925.

Prepayment Meters and Small Silver Shortage.—Cashiers at the leading banks are experiencing considerable difficulty in satisfying the demands of their customers for small change. The shortage of shillings and sixpences cannot altogether be satisfactorily accounted for, but it is thought that large numbers are used for prepayment meters, and are thus withheld from general circulation. At one branch bank in London, it was only possible for customers taking £80 to £100 in silver to have about a pound's worth of shillings and a similar amount in sixpences, the remainder of the coins being florins and half-crowns.

Company Registrations in 1925.—From Messrs. Jordan & Sons, Ltd., Company Registration Agents, of Chancery Lane, W.C. 2, we have received a copy of their annual statistical report relating to new companies registered in England during the year ended Dec. 31, 1925. In respect of both the number of companies and the amount of their capital, registrations in 1925 show an increase over those effected during the preceding year; and it is interesting to observe that the increase in both respects is in the public company section. The number of electricity, gas, and water companies registered totalled 275, and the capital amounted to £3,020,475.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following notices regarding applications to the Board of Trade under the Act:

SPECIAL ORDER.

Ellesmere Port and Whitby Urban District Council.

To extend the limits of the Council for the supply of gas so as to include the parish of Raby; to relieve them from the obligation of supplying gas, or an increased quantity of gas, in certain cases where the giving of such supply or increased supply would render necessary the laying of new mains or the enlargement or alteration of existing mains, or the extension of the distribution works of the Council; and to empower them to discontinue the supply of gas to premises in cases where appliances and fittings in connection therewith are in such a condition as to be dangerous to the occupiers.

DECLARATION OF CALORIFIC VALUE.

Bollington Urban District Council.—500 B.Th.U. (April 1.)

SOUTH METROPOLITAN GAS COMPANY.

Old Kent Road Works Foremen's Association.

The Third Annual Dinner of the Association was held on Saturday, Jan. 23, at Anderton's Hotel, Fleet Street, E.C. The chair was occupied by Mr. F. A. Frost (the Works Superintendent, and President of the Association), who was supported by a number of officials, including Mr. W. S. Bothwick (Assistant Stores Manager), Mr. J. Blow (Products Salesman), Mr. W. V. Palmer (Meter Shop Superintendent), and Mr. D. Chandler (Burner Shop Superintendent). After the dinner, an excellent musical programme, interspersed with the customary toasts, was thoroughly enjoyed. After the Loyal Toast had been honoured.

The CHAIRMAN submitted "The South Metropolitan Gas Company." He remarked that they were all proud of being associated with a Company having such a long, progressive, and unique record to its credit. The continued prosperity and extension of the Company's business was a matter of vital concern to all of them, inasmuch as it meant continuity of employment, opportunity for advancement in their positions, and many other advantages. At the present time there was a good deal of discussion going on as to what effect the Government's proposals for the re-organization of the supply of electricity might have on their own industry; and doubtless some people thought that it might affect them adversely. Personally, he saw no need for alarm, and believed they could still go on sleeping comfortably in their beds. He trusted that all of those present shared this view. When examined impartially, it could not be denied that the supply of electrical energy to the community was in a chaotic condition. So far as London was concerned, the conditions in many respects resembled those of the gas supply to the Metropolis some forty or fifty years ago. At that time the London gas undertakings re-organized themselves; and as a result of the economies effected they had experienced a long period of prosperity. Similar economies would doubtless be forthcoming in the case of electricity. Meanwhile, they of the gas industry should not be standing still; for if they did, the fable of the hare and tortoise might be repeated in their case. Provided they went on developing their business as they had done in the past, by perseverance and efficiency, they need not fear that they would not enjoy even greater prosperity in the future. It gave him great pleasure to couple with the toast the name of Mr. Charles Belben, an Employee Director, who was with them that evening.

Mr. C. H. BELBEN, in reply, said he was of the same opinion as their Chairman as to their business, and assured them that if the present-day policy of the Company was maintained they need not fear what the future might have in store for them. In their President, Dr. Carpenter, they had a gentleman who gave practically the whole of his time in attending to their business, in the interests of the employees, consumers, and shareholders alike. He asked them all to assist the management in every possible way, and assured them that by so doing they would benefit themselves as well as the Company as a whole.

The toast of "The Foremen's Association" was submitted by Mr. D. CHANDLER, who congratulated the members on the tact they exercised in the performance of their duties. He regarded them as the connecting-link between the management and the workers; and his own experience of them had been that they carried out their various duties in a conscientious and creditable manner.

The CHAIRMAN, replying to the toast, remarked that the Association was in a flourishing condition. The aims and object for which it had been established were the ideals that animated the members. The visits to other industrial works were always well attended; and he felt that the educational advantages they derived from such visits not only broadened their knowledge, but increased their efficiency.

Mr. H. PUTT proposed "The Visitors;" remarking that the members were delighted at the support and encouragement they had received from the officials in connection with their Association.

The toast was responded to by Mr. H. PERKINS (the Hon. Secretary of a like organization at the East Greenwich Works), who congratulated the members on the good work that had been accomplished.

At the conclusion the Chairman was thanked for his services, and the proceedings closed with the singing of "Auld Lang Syne."

Rational Carbonization Syndicate, Ltd., has been registered with a capital of £6000 in 2s. shares. The offices are at 126, Bishopsgate, E.C. 2.

TRIAL BY FIRE.

Jury of Housewives to Decide in Kitchen Tests.

The announcement of the Government's electrical development policy has stimulated public interest in the practical tests about to be carried out in Leeds, in order to discover the best alternative to coal for domestic heating and cooking.

Electricity *v.* gas trials are being conducted in a spirit of friendly rivalry, under the auspices of the Leeds Corporation; and the Improvements Committee have decided that on all the new estates in course of development twelve houses shall be specially equipped for the tests. Six will be all-gas and six all-electricity houses; and the experience and opinion of the twelve housewives concerned will, in the case of each estate, largely decide the future equipment of the houses. Vital factors in the test will be efficiency, economy, labour saving, and cleanliness. Piquancy has been given to the position by the fact that on the new Middleton Estate, where the coal fire and coal cooking equipment of a hundred houses has been supplemented by gas for washing and electricity for lighting, a large number of residents have approached the Gas Department with a request for gas fires and gas cookers.

Bradford, Rotherham, and Sheffield are all watching the Leeds experiment with keen interest, as they are within the area that will be served by contemplated electrical developments in the West Riding. Birmingham and Gateshead recently reported, as a result of tests in building on new estates, that elimination of coal grates and chimneys would reduce the cost of artisan dwellings by as much as £60.

TRADE NOTES.

Hoists and Trolleys.

The Ernest Sinclair Hoist & Trolley Company, of 14, Brompton Road, S.W. 1, have published some illustrated leaflets descriptive of their products.

Meldrums, Ltd.

The firm have secured orders from the Primitiva Gas Company of Buenos Ayres for a centrifugal motor-driven pump and two sulphuric acid elevators, and from the Vancouver Gas Company for a sulphate of ammonia ejector.

Ebonite Buckets for Chemicals.

The Paragon Rubber Manufacturing Company, Ltd., of Sculcoates, Hull, are the manufacturers of "Duro" three-ply ebonite buckets, which are specially made for containing acids, alkalis, &c. As these buckets are practically unbreakable, and are not affected by most acids, they are exceedingly durable.

Gasification Plants.

Messrs. Tully Sons & Co. have recently acquired the works at Millgate, Newark-on-Trent, formerly occupied by Tully Gas Plants, Ltd. (in liquidation), where they are carrying on the business of gasification plant manufacturers. This Company, which was formed about eighteen months ago, is in no way connected with Gas and Fuel Plants, Ltd.

Robert Dempster & Sons, Ltd.

The firm are circulating to gas engineers reprints of an article entitled "Universality of the Horizontal Retort," which was published in the "JOURNAL" towards the end of last year. The thermal yield from horizontals, state Messrs. Dempster, advances with improvements, and to-day 70 to 75 therms of gas can be obtained per ton of coal carbonized.

Mechanical Timekeepers.

In order to cope with their increasing business, the International Time Recording Company, Ltd., have opened new showrooms and offices at No. 112, Strand, London, S.W. 2, where they have on view a large assortment of their timing and recording machines. Thirty-five years ago the Company pioneered the time recorder industry, and to-day there are some 312 models of "International" timing and recording devices on the market. These comprise, to mention a few only of the extensive range, card time recorders, which automatically record each employee's time on a tabulated weekly card; autograph time recorders, which print time in and out against signatures; super automatic dial time recorders, which register employees in and out, however irregular their times of coming and going may be, on a tabulated weekly time sheet that requires no transcribing; door recorders, which record the time of locking and unlocking doors; and job-timing machines.

Reading Gas Company.—The workmen of the Company held their annual dinner on Jan. 23. Mr. D. H. Helps, Engineer and Manager, who presided, replying to a vote of thanks to the Chairman and Directors of the Company, remarked that the past year had been an eventful one. They had sold 77 million c.ft. of gas more than in any previous year. Mr. F. Rothwell proposed "The Chairman." He said that many of those present had known Mr. Helps for several years; and the longer they knew him, the more they appreciated his fine human qualities. The progress which the Company had made while Mr. Helps had been at the helm was sufficient indication of his skill as a pilot. Mr. Helps, in reply, said that when he came to Reading, nearly 23 years ago, the consumption of gas was about 400 million c.ft.; now it was over 1100 millions. He always appreciated the help that he received from the staff and workmen in all departments.

CONTRACTS OPEN.

Exhausters, Engines, &c.

The Gas Department of the Borough of Middleton are inviting tenders for the supply and erection of two exhausters with steam engines and connections. [See advert. on p. 300.]

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The market has, during the past week, been somewhat quieter in tone, and, in the case of Northumberland steams, perhaps slightly easier. The immediate outlook, however, remains satisfactory, and the position of the Durham gas market is such that values are fully maintained.

It is difficult to find any precise reason for the easier tone; but it may be attributable in part to tonnage troubles. Bad weather and the consequent delays in arrival of shipping are always liable to cause coal to be thrown on the market at short notice.

The gas coal collieries are mostly well sold for the present month, and Wear Specials are quoted at 19s. 6d. to 20s. Best makes remain at 18s. 6d., and seconds are 16s. 6d. to 16s. 9d. Durham unscreened coking is about 16s. 6d. to 16s. 9d., and bunkers are firm at about 17s. 9d. for best makes, and 16s. 6d. to 17s. for others.

The demand for gas coke is good, and supplies are fully booked for February, nominal prices being 24s. 6d. to 25s. 6d. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

There has not been quite so brisk a demand for household coal during the past week. Although prices are steady, merchants report that they have no difficulty in executing orders at a few days' notice.

The industrial situation does not appear to improve to any material extent. Although some of the better-grade fuels have advanced slightly in price, the dry coals are stationary.

The outlook for gas coal pits is rather uncertain—an opinion evidently shared by some of the consumers, who are purchasing ahead for more than twelve months at figures rather higher than operated last summer.

The export section is quiet; but owing to the demands of the inland market, certain qualities, such as hards and washed doubles, are firm.

The following are the Humber bunker and export prices (f.o.b. usual shipping ports): South Yorkshire—Hards, Association, 22s. to 22s. 6d.; screened gas coal, 21s. to 22s.; washed doubles, 20s. to 20s. 6d.; washed singles, 18s. to 18s. 6d.; washed smalls, 13s. 6d. to 14s.; rough slack, 10s. 3d.; smithy peas, 19s. 6d. to 21s. 6d. West Yorkshire—Hartleys (f.o.b. Goole), 18s. 6d.; washed doubles, 19s.; washed singles, 17s. 6d.; washed smalls, 13s. 6d.; unwashed doubles, 14s. 6d.; rough slack, 10s. 9d.; coking smalls, 10s. to 10s. 6d. Derbyshire and Nottinghamshire—Top hards, 22s. 6d. to 23s. 6d.; washed singles, 18s.; washed smalls, 13s. 3d. to 13s. 9d.; rough slack, 10s. 3d. to 10s. 6d. Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 18s. to 20s.; gas coke, 24s. 6d. to 26s.; furnace coke, 19s. 6d. to 20s. 6d. all per ton.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

Under the pressure of a strong demand for all descriptions of fuel, prices are upheld at the higher level recently reached. The collieries are working under a heavy handicap in the matter of transport. True, the delays on the railways are less acute than prior to Christmas, but are still all too frequent. The position generally is very strong. There is a ready outlet for all the output, and stocks at the collieries are small. A gradual improvement is noticeable in the call for industrials, though there is plenty of room for increase.

Gas coke is well taken up, and electricity works are large consumers of slacks, for which, except for the very finest qualities, little better than dust, a continuous active demand is experienced. Nuts and beans are in like case.

Metropolitan Gas Company of Melbourne.—Messrs. John Terry & Co., as Agents, have received a telegram from the Metropolitan Gas Company of Melbourne, informing them that the net profits for the six months to Dec. 31, 1925, were £151,550. A dividend of 7s. 6d. per share has been declared, £69,000 transferred to reserve, and £74,500 carried forward.

Lighting Trades Staff Dinner and Dance.—On Friday last, in the Georgian Room of the Piccadilly Hotel, the staff of Lighting Trades, Ltd., of Garratt Lane, Wandsworth, S.W., to the number of 130, were the guests of the Directors at a dinner and dance. Mr. H. J. Mitchell (the Chairman of the Company) presided at the dinner, and was supported by other members of the Board. The Loyal Toast having been duly honoured, Mr. Mitchell expressed the pleasure it gave him and his co-directors in again meeting the staff at this, their third, annual social gathering. After referring to the Company's position, he took the opportunity of conveying the thanks of the Board to the staff for their loyal support and co-operation. Musical honours were accorded the toast of "The Chairman and Directors," which was proposed by Mr. A. T. Metcalfe (the General Manager), who expressed thanks, on behalf of the staff, for the enjoyable evening the Directors had given them. Miss Cotterell and Messrs. Marrable and Martin were thanked for the excellent manner in which the programme had been arranged.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 1.

Interest in pitch is maintained, and the market is firm. For prompt delivery 60s. per ton has been paid, and buyers are also displaying interest for next season's shipment. Exports for December amounted to 45,724 tons, the total for July-December, 1925, being 155,100 tons, as against 108,815 tons for the corresponding period of 1924.

Apart from the home trade, there are also large inquiries in the market for tar for shipment, and the whole position is firm.

Creosote is unchanged at about 7⅛d. per gallon, in bulk, at makers' works.

Tar spirits are steady. Pure benzole and pure toluole are 2s. 2d. to 2s. 3d. per gallon, and 95/160 solvent naphtha 1s. 10d. to 1s. 11d. per gallon.

Tar Products in the Provinces.

Feb. 1.

The market for pitch remains quite steady, and there seems to be a little more demand from the Continent, although buyers do not appear at all inclined to pay the prices which are at present being asked for this season's delivery.

As regards next season, buyers do not yet seem to be very interested, and the figures which are being asked by makers on this side are too near to-day's price to induce dealers to speculate.

Creosote is steady, but without any material change in price.

Water-white products are firm. Some quantity of benzole is reported to have been sold to the end of June next at a fair price.

Carbolic acid is firm, and the demand from the Continent continues.

Crystals carbolic is steady; but up to the present consumers are refusing to pay the last advance demanded by the makers.

Naphthalene and anthracene are still neglected.

The average values for gas-works products during the week were: Gas-works coal tar, 39s. 9d. to 44s. 9d. Pitch, East Coast, 57s. to 59s. f.o.b. West Coast—Manchester, 51s. to 53s. 6d.; Liverpool, 52s. to 54s.; Clyde, 55s. to 56s. Benzole, 90 p.ct. North, 1s. 8½d. to 1s. 9½d.; crude, 65 p.ct., at 120° C., 1s. 1d. to 1s. 2d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 8½d. to 1s. 9½d. Toluole, naked, North, 1s. 8d. to 1s. 9d., nominal. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 7½d. to 1s. 8½d. Heavy naphtha, North, 11½d. to 1s. 0½d. Creosote, in bulk, North, liquid, 6½d. to 6¾d.; salty, 6d. to 6⅛d.; Scotland, 5⅞d. to 6d. Heavy oils, in bulk, North, 6¾d. to 7d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Liberty and Property Defence League.

In the report of the proceedings of the Liberty and Property Defence League for the past year, attention is called to the "flood of legislation" and the 97 new Acts which were added to the Statute Book in 1925. In the opinion of the Council of the League "many of these mean more taxes, more rates, more officials, and more interference with personal freedom and private property. Had 97 old Acts been repealed, and the trades and industries of the country been thus freed from the hampering and harassing of Government meddling, the work of the session would have been of national benefit, instead of, for the most part, a national detriment." It is urged that "unless a powerful national barrier against State and Municipal Socialism is constructed, independent of party politics, all personal liberty, private enterprise, and private property will be destroyed." According to the Council, the only way to establish prosperity and tranquility is by (1) the reduction of public expenditure to the minimum of actual and proved public needs, (2) the repeal of all laws in restraint of personal liberty and the freedom of industry and trade, and (3) the abolition of labour union tyranny and the assertion of the right to work.

Profits and Price at Pontypridd.—It was decided at the last meeting of the Pontypridd Urban District Council that the Gas Department, out of their profits, should give £2906 to the relief of the rates. This makes a total of £4226 since April, 1925, from the Gas Department for this purpose. During the same period the price of gas has been reduced 5d. per 1000 c.ft. The local press, commenting on these facts, congratulated Mr. David Muir (Gas Engineer and Manager) on his successful management, and pointed out that the unaccounted-for gas has reached the lowest point for sixteen years.

The Government and Electricity.—The Prime Minister, in his recent Sunderland speech, said he would like to reiterate the cautionary reserve he employed when he explained the Government's electricity scheme. "I want to repeat," he said, "that while cheaper and more abundant supplies of electricity are admirable in themselves, and, indeed, necessary, they will not alone restore good trade or give us industrial peace. Do not be led away by excitable people who seem to think that electricity in two or three years is going to transform the face of the country, and make coal of no further use. The truth is, of course, electricity can be put to many uses; but it is a striking thing that the growth of electricity in other countries where it has been developed more than here has led to (or, if you like, been accompanied by) a growth all along the front of industry—a growth in the use of gas and in the use of coal, and a development of industry generally. Expressions of doubt and fear have been heard from those who are interested in gas. There is assuredly room, not only for electricity and gas in this country, but for an enormous development of both."

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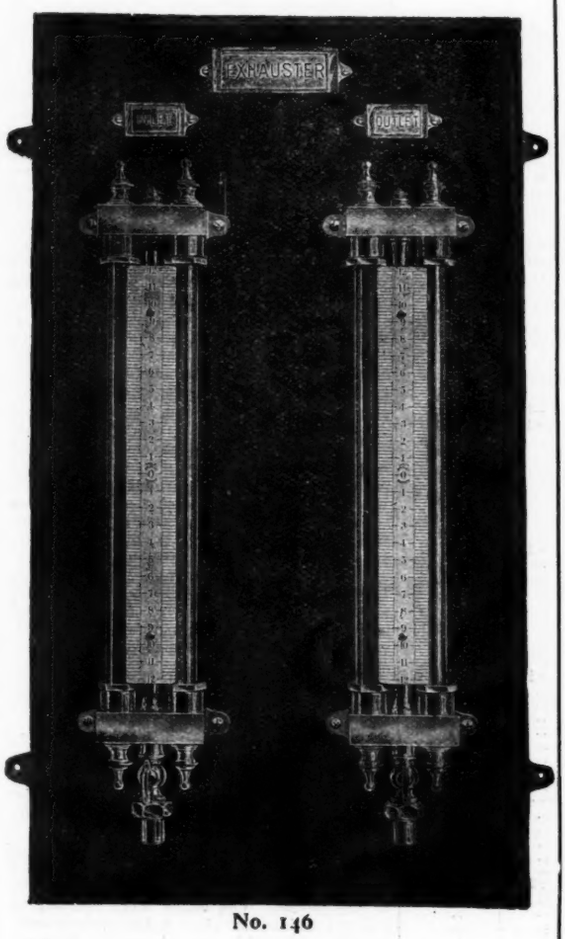

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Safety Patrols.

In the course of an article on "Maintaining Interest in Safety," which has appeared in the "Gas Age-Record," Mr. Carl B. Auel (President of the National Safety Council of the United States) says that some works have found (either as a substitute for, or in addition to, their Safety Committee) a "Safety Patrol" to be of wonderful assistance in safety work. Briefly, a body of men is formed among the workers in a plant, one or more being selected from each branch, and instructed to patrol their respective departments and observe the employees, to see that they are handling themselves and their equipment properly—for example, to see that they are not wearing gloves where such would involve a hazard, &c. If there is a likelihood of an employee taking amiss any word of caution, the patrol are instructed to call the attention of the foreman to the man in question, and compel him to make the necessary correction. For the time so spent away from their regular occupations, they are paid their average earned hourly rates. These men, being carefully selected, are, as a rule, changed only for some special reason.

Switzerland's Wembley.

The Basle Fair, an annual event of great importance to Swiss industry, will be held this year from April 7 to 17. It is the direct descendant of the ancient Fair which has been held at Basle, at varying intervals, since the fifteenth century. Founded on this solid basis, the Swiss Industries Fair has recently developed into an important commercial enterprise. Its progress since it was re-organized on the present lines in 1917 has been constant; visitors being attracted from all parts of the world. This year the Fair is being entirely rebuilt, on a scale reminiscent of Wembley. To facilitate a rapid survey of the comprehensive list of manufactures, exhibits of a similar class are being grouped together. These groups include chemical and pharmaceutical products; exhibits relating to lighting, heating, and sanitation; inventions and patents; small machinery and tools; and fine mechanical instruments and apparatus. The objects of the Fair are to encourage Swiss exports, and to foster international trade relations. Everything possible is being done to provide trade facilities for foreign buyers. Representatives of British firms who may contemplate visiting the Fair can obtain full information through the Commercial Division, Swiss Legation, 32, Queen Anne Street, London, W. 1.

Mr. William Henry Carder, of Tipton, who was Secretary to the South Staffordshire Mond Gas Company, left estate of the gross value of £4835, with net personalty £4554.

It is nearly 100 years since coal gas was introduced into Dundee, and steps are to be taken to recognize the centenary. Mr. J. Dickson, the City Gas Engineer, has been asked to report as to some form of commemoration.

On Jan. 21, Mr. A. J. Harrison, Manager of the Accrington District Gas Board, addressed the Accrington and District Chamber of Trade on the subject of "Coal Conservation." Mr. Harrison dealt with the question in an interesting and convincing manner. He was heartily thanked on the proposition of Councillor Dawson (Oswaldtwistle).

Members of the Park Congregational Institute visited the Halifax Corporation Gas-Works on Jan. 26, and were conducted round by Mr. W. B. McLusky (the Engineer and General Manager) and members of his staff. In responding to a vote of thanks, Mr. McLusky referred to the great value of the gas undertaking to Halifax people, both from the standpoint of service and as a financial asset.

At a meeting of the Accrington and District Gas Board, on Jan. 28, Alderman Dewhurst (Chairman) said the progress in gas consumption continued. Mr. A. J. Harrison (the Manager) mentioned that the service pipes had been renewed in over 600 houses since October. He reported upon the necessity of laying an additional 6-in. pipe along the main road to Huncoat, at an estimated cost of £812; also an extension of a 9-in. main from Paxton Street to Richmond Street, at an estimated cost of £965.

An explosion occurred on Thursday, Jan. 28, at the Hooper Street premises of Messrs. Thomas Piggott & Co., Ltd., Spring Hill, Birmingham. The explosion took place in a compressor, and was thought to be probably due to a leakage of gas, which may have caused a disproportion in the mixture used for welding. There were about 150 people in the building at the time, and four of the workers were struck by flying fragments of metal. The injuries were, however, not of a serious character.

At a meeting of the Sidmouth Urban Council on the 27th ult., Mr. Saunders called attention to the flooding of the gas and electricity works, which had cost the Council £165 in re-setting one of the retort beds. He suggested that the Committee take into consideration the raising of the wall, which would prevent considerable flooding. Mr. Halse said the Manager of the gas-works called attention to the matter thirteen years ago, and it had been considered since, but with no definite result. He thought the bulk of the flooding came over the sea wall, and entered the gas-works that way. The proposal to raise the works wall was referred to a Committee.

The Ribble Joint Committee have received a deputation from the Longridge Gas Company regarding the discharge of gas liquor from their works into the brook. On the occasion referred to, the storage wells overflowed into the stream, because the firm taking the ammoniacal liquor were late in collecting it. The Company undertook to instal indicators on the wells, and stated that they had already arranged that any excess liquor should be placed on their own land, 100 yards from the stream. The Committee gave the Company notice of proceedings, which, however, will not be taken so long as the Company comply with their undertaking.

STOCK MARKET REPORT.

WITH the collapse of the Rubber boom, brought about mainly by the fall in the price of "spot" rubber, business on the Stock Exchange last week was exceedingly dull and uninteresting. Prices wobbled, and considerable uncertainty existed in the minds of both dealers and investors with regard to the future. The rush of new issues, including the foreign loans, have of course absorbed a large proportion of available money; and if the optimism displayed at the various Bank meetings is justified, it is possible that the trade expansion itself is, by the realization of securities, assisting in depressing prices.

There were no outstanding features. Gilt-edged securities, though quiet, were inclined to harden; and in the Foreign Market Brazilian bonds improved slightly. Electrical manufacturing shares were again active; but profit-taking by speculators depressed prices at the close.

While the business done in Gas Stocks and Shares was lower than usual, the tendency of prices was again on the downward scale. Conversation with members having a knowledge of the industry elicited the opinion that prices would fall still further. Actually last week only two companies' stocks were marked down to any extent. The Gas Light and Coke Company's stock, which may be described by reason of the large number of dealings in their stock as the barometer of gas stocks, dropped a further point; and both the Commercial stocks two points. The former Company's accounts have now been distributed, and examination thereof reveals a very satisfactory state of affairs, not the least of which is the substantial increase—3·80 p.ct.—in the consumption of gas as compared with the previous year.

The following transactions were recorded during the week:

On Monday, Bombay 18s. 3d., 18s. 7¼d., British 103, 103½, 104, 105⅝, Continental Union 35, Croydon sliding-scale 98½, European 6, 6⅛, Gas Light and Coke 81, 81⅛, 82, 82⅜, 82½, 82¾, 83, 3½ p.ct. maximum 59¼, 60, 60½, 61, 3 p.ct. debenture 58½, 59½, Hornsey 7 p.ct. 133, Imperial Continental 135, 136½, 137, Montevideo 70½, Oriental 101¼, 102½, Primitiva 11s. 6d., 11s. 9d., 12s., South Metropolitan 93⅛, 94, 94¼, 94½, 94⅞, South Suburban 99, 100, 100½, Tottenham "B" 90½, Uxbridge (Maidenhead stock) 92. Supplementary prices, Bath 95, Southend-on-Sea 5 p.ct. new 84, 5 p.ct. new "B" 81.

On Tuesday, Alliance and Dublin 71, 71¼, 71⅜, 71½, Bombay 18s. 10½d., Brighton and Hove 174, British 103, 103½, Commercial 4 p.ct. 82, 3½ p.ct. 81, 3 p.ct. debenture 55¼, Croydon sliding-scale 99½, maximum dividend 83, 83½, Gas Light and Coke 81½, 81¾, 4 p.ct. preference 77½, 78½, 3 p.ct. debenture 59½, Imperial Continental 136½, 137, Montevideo 71, Oriental 102, Primitiva 11s. 6d., 12s., South Metropolitan 93½, 93¾, 93⅞, 94, 94⅛, South Suburban 5 p.ct. 99. Supplementary prices, Bournemouth 7 p.ct. debenture 103½, Danish 7, Gravesend and Milton 65.

On Wednesday, Cape Town 4½ p.ct. 1st mort. debenture 70½, 71½, Colombo 26s. 3d., 26s. 6d., 26s. 9d., Commercial 4 p.ct. 81½, European 6½, Gas Light and Coke 81½, 81⅞, 82, 4 p.ct. preference 77½, 3 p.ct. debenture 58½, Imperial Continental 135½, 136½, 137¼, 137½, Maidstone 5 p.ct. 119½, 120, Primitiva 11s. 9d., 12s., South Metropolitan 93¼, 93⅜, 94¼, South Suburban 5 p.ct. debenture 95½, Swansea 6½ p.ct. debenture 101, 101¾, Wandsworth "B" 108, Wimbledon stock 98. Supplementary prices, Bournemouth 7 p.ct. debenture 104, Cape Town 5 p.ct. mort. debentures 70, Wandsworth 4 p.ct. debenture 75.

On Thursday, Commercial 4 p.ct. 80, Gas Light and Coke 81, 81¼, 81½, 81⅞, 82, 82¼, 4 p.ct. preference 77, 77½, Imperial Continental 135½, 136, Primitiva 11s. 6d., 11s. 9d., 11s. 10½d., 4 p.ct. (Buenos Ayres) debenture 65¼, South African 80s., South Suburban 5 p.ct. 99, 100¼, 5 p.ct. debenture 96½, Tottenham "B" 89. Supplementary prices, Wandsworth 3½ p.ct. new 92, 93.

On Friday, Bombay 18s. 3d., Commercial 3½ p.ct. 80, Gas Light and Coke 81¼, 81½, 81⅞, 82, 3½ p.ct. maximum 60, 3 p.ct. debenture 59½, 59¾, Montevideo 71, 72, Primitiva 11s. 3d., 11s. 9d., Wandsworth, Wimbledon 5 p.ct. 103.

Comfortable conditions existed in Lombard Street at the end of the week, notwithstanding the fact that it was the last working day of the month. Old loans were renewed at 4 p.ct.; and at the close balances were occasionally obtainable at 3½ p.ct. Discount quotations were firmer; but Treasury Bills, of which the full amount offered were allotted, averaged £4 12s. 9·71d. p.ct. only, which is the lowest rate since Dec. 4.

In the Foreign Exchange Market, the chief feature was the steady support given to the French franc, which improved to 127.90, finally closing at 128.15. Belgian francs were steady at 106.36. Italian lire cheapened to 120.65. The Dutch florin was weaker, the Amsterdam rate closing at 12.13.

Silver was a quiet market; the price declining 1/16d. to 30 11/16d. per oz. Gold also was cheaper. The absence of any demand caused the price to fall to 84s. 9¾d. per oz.; the first time that the official price in the open market has fallen below 84s. 10½d. per oz. since the restoration of the gold standard.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Jan. 29.	Rise or Fall.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Aug. 13	5	5	Aldershot 5 p.c. max. C.	75—78	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	70—75	..	..
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	69—73	..	..
374,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	58—63	..	71—71½
300,000	1	Oct. 22	1/7⅛	1/7⅛	Bombay, Ltd.	7/8—1	..	..
170,000	10	Aug. 13	8½	8½	Bournemouth 5 p.c.	12—13	..	18/3—18/10½
425,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	..
50,000	Stk.	Jan. 7	3	3	Do. 3 p.c. Deb.	55—58	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	172—177	..	174
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	..
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	89—91*a*	..	..
855,000	,,	Oct. 8	7	8	British Ord.	103—108	..	103—105⅝
100,000	,,	Jan. 7	7	7	Do. 7 p.c. Pref.	117—122	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69—74	..	..
100,000	10	Dec. 17	8	6	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	Jan. 7	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,880	,,	July 23	6	6	Cardiff Con. Ord.	98—101	..	70½—71½
237,860	,,	Jan. 7	7½	7½	Do. 7½ p.c. Red. Deb.	98—101	..	..
157,150	,,	Aug. 13	6½	6	Chester 5 p.c. Ord.	90—95*b*	..	..
79,185	1	Oct. 8	—	5	Colombo Ltd. Ord.	25/—27/-	..	..
24,500	1	,,	—	2/-	Do. 7 p.c. Pref.	21/—23/-	..	26/3—26/9
1,513,280	Stk.	July 23	5/14.8	1/4½	Commercial 4 p.c. Cap.	80—85	−2	..
560,000	,,	,,	5⅛	5⅛	Do. 3½ p.c. Cap.	80—85	−2	80—82
475,000	,,	Dec. 17	5/8/4	5/8/4	Do. 3 p.c. Deb.	55—58	..	80—81
800,000	,,	Oct. 8	3	3	Continental Union, Ltd.	35—40	..	55½
200,000	,,	,,	—	4	Do. 7 p.c. Pref.	88—91	..	35
660,000	,,	Aug. 13	7	7	Croydon sliding scale	97—101	..	..
284,975	,,	,,	6½	6½	Do. max. div.	81—84	..	98½—99½
492,270	,,	Aug. 13	5	5	Derby Con.	107—109*c*	..	83—83½
55,000	,,	Dec. 17	9	6	Do. Deb.	74—76*c*	..	..
209,000	,,	Sept. 10	4	4	East Hull Ord. 5 p.c.	88—91	..	..
50,000	,,	Dec. 17	5	5	Eastbourne 5 p.c. Deb.	93—98	..	..
1,002,180	10	July 23	—	5	European, Ltd.	5½—6½	..	..
16,413,285	Stk.	Aug. 13	4	6	Gas Light & Coke 4 p.c. Ord.	81—83	..	6—6⅛
2,600,000	,,	,,	5⅛	5⅛	Do. 3½ p.c. max.	59—62	−1	81—83
4,062,235	,,	,,	3½	3½	Do. 4 p.c. Con. Pref.	77—80	..	59¼—61
4,761,930	,,	Dec. 17	4	4	Do. 3 p.c. Con. Deb.	58—61	..	77—78⅜
130,000	,,	,,	3	3	Do. 10 p.c. Bonds	..	..	58⅜—59¼
42,000	,,	—	10	10	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 10	7½	7½	Hastings & St L. 5 p.c. Conv.	90—95	..	..
258,740	,,	,,	6½	6½	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	5½	5½	Hongkong & China, Ltd.	19½—20⅛	..	..
86,600	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	..
1,976,000	,,	Nov. 19	59	10	Imperial Continental Cap.	134—139	+1	133
226,170	,,	Aug. 13	10	10	Do. 3½ p.c. Red. Deb.	70—73	..	135—137½
235,242	,,	Aug. 13	3½	3½	Lea Bridge 5 p.c. Ord.	97—102	..	..
2,127,340	,,	Aug. 13	6½	6½	Liverpool 5 p.c. Ord.	85—85½*b*	..	..
600,000	,,	Sept. 24	5½	5½	Do. 7 p.c. Red. Pref.	103—105*b*	..	..
165,736	,,	Aug. 27	7	7	Maidstone 5 p.c. Cap.	118—128	..	..
63,480	,,	Dec. 17	8	9	Do. 3 p.c. Deb.	54—59	..	119½—120
75,000	5	Dec. 3	3⅜	3⅜	Malta & Mediterranean	4½—5	..	..
541,920	Stk.	Nov. 19	7	6	Montevideo, Ltd.	69—73	..	77—78½
2,061,315	,,	Aug. 13	4	4	Newcastle & Gateshead Con.	71½—72½*d*	+½	..
300,929	,,	,,	5	5	Do. 4 p.c. Pref.	75½—76½*d*	..	70½—72
529,705	,,	Dec. 17	4	4	Do. 3½ p.c. Deb.	66½—67½*d*	..	..
15,000	,,	Aug. 27	3¼	3¼	North Middlesex 10 p.c.	160—170	..	..
75,940	,,	,,	12	11½	Do. 7 p.c.	115—120	..	..
300,000	Stk.	Dec. 3	8⅜	8⅜	Oriental, Ltd.	98—103	..	..
188,120	,,	Jan. 7	7	9	Plym'th & Ston'house 5 p.c.	110—115	..	101½—102
60,000	50	Aug. 27	7⅞	7⅞	Portsea Island B	93—96	..	..
100,000	50	,,	14	14	Do. C	90—95	..	..
2,289,909	1	—	13	13	Primitiva Ord.	11/6—12/6	−/6	11/3—12/0
302,600	100	Dec. 1	—	—	Do. 4 p.c. Red. Deb.	82—84	..	..
600,000	Stk.	Jan. 21	4	4	Do. 4 p.c. Red. Deb. 1911	63—65*	..	..
198,744	,,	Dec. 17	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	65½
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db	65—67	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7⅛—8	..	..
125,000	50	Jan. 4	5	5	Do. 5 p.c. Red. Deb.	43—46	+2	..
270,000	Stk.	Aug. 27	5⅜	5⅛	Sheffield A	99—101*e*	..	..
419,968	,,	,,	5⅜	5⅛	Do. B	99—100*e*	..	..
1,047,000	,,	,,	5⅜	5⅛	Do. C	99—100*e*	..	..
90,000	10	June 11	6	4	South African	5—7	..	4
6,609,895	Stk.	Aug. 13	6½	5	South Met. Ord.	93—96	..	93½—94⅞
1,895,445	,,	Jan. 7	3	3	Do. 3 p.c. Deb.	56—59	..	..
734,000	,,	Sept. 10	6½	6⅜	Do. 6½ p.c. Red. Db.	103—105	..	..
91,500	,,	Aug. 13	8½	8½	South Shields Con.	124—126*d*	..	..
1,187,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	99—103	..	..
368,837	,,	Dec. 17	5	5	Do. 5 p.c. Deb.	94—97	..	99—100½
647,740	,,	Oct. 22	5	5	South'mpton Ord. 5 p.c.max	78—81	..	95½—96½
121,275	,,	Jan. 7	4	4	Do. 4 p.c. Deb.	69—74	..	..
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref.	101—103	..	..
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	101—101½
120,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	110—115	..	..
882,275	,,	,,	6½	5⅞	Do. B 3½ p.c.	88—93	..	89—90½
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	..	..
181,255	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	74—77	..	..
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New	70—71*d*	−½	..
197,294	,,	Aug. 27	6⅝	6⅝	Uxbridge, Maidenhead, & Wycombe 5 p.c.	93—98	..	..
88,330	,,	,,	5	5	Do. 5 p.c. Pref.	93—98	..	..
91,800	,,	,,	6⅝	6⅝	Do. 5 p.c. Maidenh'd	88—93	..	92
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 9	9½	8¼	Wandsworth A 5 p.c.	128—133	..	..
255,636	,,	,,	7⅜	7	Do. B 3½ p.c.	109—114	..	108
392,955	,,	,,	6/9/6	5/19/0	Do. C and New	92—97	..	92—93
352,000	,,	,,	7⅜	6⅝	Wimbledon 5 p.c.	103—108	..	98—103
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	113—118	..	..
88,416	,,	Jan. 7	3	3	3 p.c. Deb.	55—58	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *Ex. div.